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Reorganization of I. P. & P. C. Proposed

S. E. C. Report, First of Its Kind, Weighs Recapitalization Plan — Main Point At Issue is Whether Fair Treatment is Accorded to Preferred Stockholders — Various Parts of Project is Minutely Analyzed.

WASHINGTON, D. C., May 5, 1937—The Securities and Exchange Commission issued a report today concerning a reorganization plan for the International Paper and Power Company which is to be presented to the stockholders at their annual meeting in June. In issuing this, the first major report of the kind to be made under the Public Utility Holding Company Act of 1935, the SEC held it had authority to do so, although the applicant is not a registered holding company, having filed an application for exemption that has yet to be passed upon by the commission. Meanwhile, the company had sought to remove any "cloud" by submitting the plan to the SEC.

The recapitalization plan proposed by the company is intended to wipe out a deficit amounting to $19,734,000 which must be eliminated before the company can pay dividends on either its preferred or common stock, and also would cancel $36,678,000 of accumulated dividends now due to preferred stockholders. One of the main points at issue is whether fair treatment is accorded to the preferred stockholders under the plan.

For the benefit of stockholders, the commission reviewed in detail various parts of the plan, in certain instances pointing out what it believed to be favorable or unfavorable to its consummation, but did not make definite recommendations, leaving to the stockholders the determination of the course to be followed in casting their votes.

Commissioner Healy Dissents

Commissioner Robert E. Healy wrote a vigorous dissenting opinion.

"I cannot," he said, "vote in favor of this report; first, because I think we have no jurisdiction to make it; second, because I think the plan is not fair to the preferred stockholders and that the report (if there is to be one) should say so plainly."

A feature of the majority report was a reference to the Federal tax of 1936 on undistributed corporate profits, as to the wisdom of which, however, the commission offered no opinion.

"Stockholders," the commission said, "must recognize these simple facts. First, that until the deficit of $19,734,000 is eliminated, no dividends of any character can be paid, and, second, that until the preferred stockholders have been paid their arrears of accumulated dividends of $36,678,000 no dividends can be paid upon the common stock.

"It is necessary to grasp the significance of one other factor in order to understand the reasons underlying the plan of recapitalization. This is the operation of the undistributed-corporate-profits tax. The company's declaration of trust provides that as long as there is a deficit on the company's books, no distribution of profits can be made by way of dividend. Consequently, profits until the deficit were eliminated would be subject to the undistributed-corporate-profits tax. This tax, in the judgment of the company's officials, on the basis of estimated earnings, would amount to over $5,000,000.

"The existence of such a tax possibility makes elimination of the deficit desirable from the standpoint of both preferred and common stockholders, but primarily from the standpoint of the latter because in the event that that $5,000,000 should become payable, it would in the end come out of the pocket of the common stockholders."

Alternative Suggested

The commission, however, called the attention of the holders of preferred stock to the fact that elimination of the capital deficit could be accomplished without carrying out the proposed plan of reorganization; that is, by reducing the stated value of the common stock on the company's books. Consequently, it added, "although the proposed plan will have the effect of eliminating this deficit, its prime purpose is not that."

Calculations regarding the probable effect of the corporate-profits tax were based on estimates of company officials that the profits, which were slightly more than $5,000,000 in 1936 after deficits from 1931 to 1935, would be approximately $10,000,000 in 1937.

(Continued on page 37)

Consolidated Grants Rise At Four Mills

Twentieth Year Company Has Signed Contract—Labor Union Organized At Nekoosa — Wisconsin Safety Conference for Merrill — William E. Buchanan Granted Patent On Seamless Method of Joining Wire Cloth.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., May 10, 1937—Wage increases of seven cents per hour for men and four cents for women were announced last week by the Consolidated Water Power and Paper Company, affecting workers in all of its four mills at Wisconsin Rapids, Biron, Stevens Point and Appleton, Wis. The schedules took effect May 9. The new scale followed negotiation of a new contract with union representatives of the locals affiliated with the American Federation of Labor. This is the twentieth year the company has signed a contract with the unions, and the present agreement stipulates that the A. F. of L. unions have full jurisdiction and collective bargaining authority. Vacations with pay are granted all employees with the company three years or more. The wage increase is the second granted this year, and provides a new minimum of 53 cents per hour for men, and 41 to 43 cents for women.

Paper Chemistry Institute

Growth of the Institute of Paper Chemistry, Appleton, Wis., from its small beginnings with three students and Dr. Otto Kress as the only instructor to its present enrollment of 43 students, and its teaching and research staff of about 75 persons was described by Dr. C. J. West, editor of the Institute, in an address last week at the Rotary Club at Appleton, Wis. It is today supported by 60 member mills, he said, and administered by a board of trustees consisting of ten of the leading executives of the industry. As the Institute exists today, declared Dr. West, its purposes are: first, education; second, fundamental as well as applied research for the paper industry; third, development of a library for the use of the industry; and fourth, to furnish a place where the industry can go with its problems.

Forest Products Laboratory

Senator F. Ryan Duffy of Fond du Lac, Wis., is using his efforts to restore a $20,000 item for the United States Forest Products Laboratory at Madison, Wis., to bring that appropriation up to budget estimates. The House had previously voted $608.-361. Half of the $20,000 would be used for experimenting in new ways of utilizing woods for the manufacture of paper. The laboratory hopes to develop methods by which other Wisconsin woods than spruce, hemlock and fir can be used.

Labor Union for Nekoosa-Edwards

Organization of an independent labor union under the Wisconsin Severson law has been started by 170 employees of the Nekoosa-Edwards Paper Company, Nekoosa, Wis. A meeting was held last week at which preliminary steps were taken, and an attorney has been engaged to draw up articles of organization.

The new union will take the place of a mill council which has been functioning for a number of years. It will be entirely independent of employers, and is not to be affiliated with any of the national union organizations.

J. E. Alexander, president of the company, said he expected the employes to organize under the new law in such a manner as to qualify for recognition by the Wisconsin Labor Relations Board.

Pulpwood for Munising

The Munising Paper Company, Munising, Mich., has contracted for the rafting of pulpwood across Lake Superior to its mill this summer from the Pigeon River region, near Port Arthur, Ont. The rafts will total about 14,000 cords, one to arrive in June and another in July. The company will ship an additional 10,000 cords by boat from points along the mouth of the St. Lawrence River.

Safety Conference for Merrill

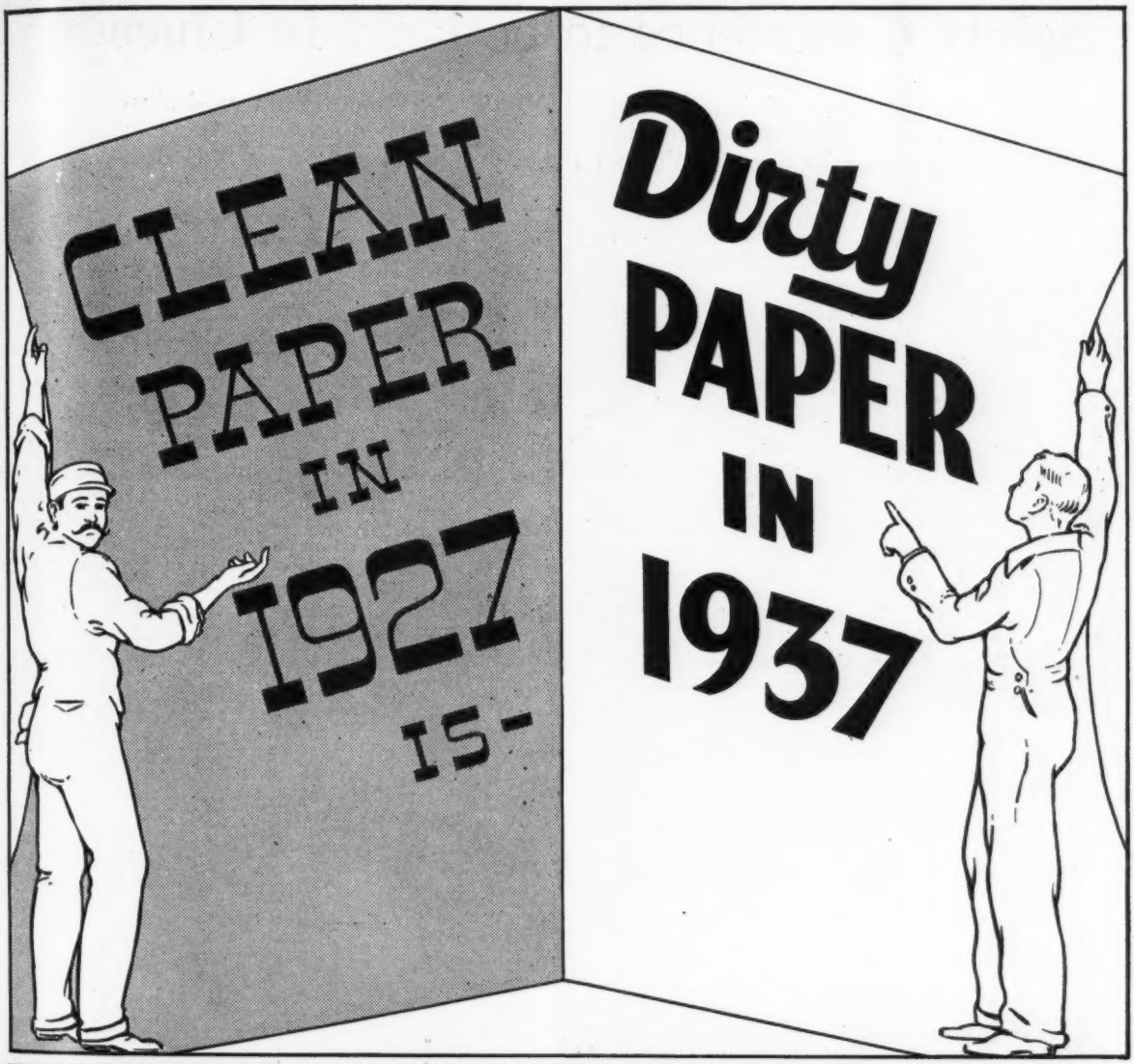
Mills of the upper section of Wisconsin will have a large representation at the Wisconsin Valley Safety Conference, to be held at Merrill, Wis., June 10. An attendance of approximately 1,000 is expected. A sectional meeting is planned for paper and pulp mill representatives and will be in charge of Clayton Braatz, of the Marathon Paper Mills Company, Rothschild, Wis. General sessions will be held in the morning with prominent speakers, including Voyta Wrabetz, chairman of the Wisconsin Industrial Commission. A parade will be held in the afternoon, and there will be a banquet in the evening.

Badger Safety Meeting and Dance

Four hundred employees and their families enjoyed a safety meeting and dance conducted Saturday evening, May 1, by the Badger Paper Mills, Inc., Peshtigo, Wis. E. A. Meyer, president, addressed the employees in encouragement of the mill's safety program. The principal speech of the evening was by Harry A. Nelson, director of Workmen's compensation of the Wisconsin Industrial Commission. He explained recent legislation that will benefit the workers. Louis Bandow and Robert Murwin assisted in conducting the meeting and the entertainment.

Tomahawk Dam Repairs

The Wisconsin Public Service Corporation has been authorized by the Wisconsin Public Service Commission to proceed with repairs on the former Tomahawk Pulp and Paper Company dam at Tomahawk, Wis., which it now owns, and the erection of a new hydro-electric plant and substation. The company expects to spend $504,421 on the project. The utility reported it had spent $20,630 for repairs since it acquired the dam in 1935 at a cost of $8,000. The new plant will relieve the load at the company's transmission plant at Green Bay, Wis., and will enable it to supply power to paper mills of the Wisconsin River Valley direct from the Tomahawk station.



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Safety Conference to be Held In Chicago

Fifteenth Annual Midwest Meeting to Confer At Hotel Sherman—Industrial Groups Will Be Informed Upon Latest Developments In Accident Prevention — Request for Various Paper Grades Slightly Less Retarded.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., May 10, 1937—The Fifteenth Annual Midwest Safety Conference convenes at the Hotel Sherman, Chicago, May 12, 13 and 14. Not only have paper manufacturers in Michigan, Wisconsin, Illinois and Indiana evidenced keen interest in the informative programs of the session but they have also indicated a desire to view the exhibits which will include every conceivable type of safety appliance which will be on display.

Among the exhibitors are manufacturers of safety shoes, protective clothing, goggles, skin preparations, fire extinguishing apparatus, gloves, saffolding and first aid kits. More than thirty exhibitors are scheduled to display their products.

Devoted to the study of various phases of industrial and public safety, the conference is called annually to focus attention of industrial groups upon the latest developments in the field of accident prevention. Outstanding speakers from various parts of the country will address the several sessions. Governor Harold G. Hoffman, of New Jersey, vice president in charge of public safety of the National Safety Council, will speak at the annual banquet on "Horse Power and Horse Sense." Included among the exhibitors are the following organizations:

The Exhibitors

Aetna Casualty and Surety Company and affiliated companies, American First Aid Supply Company, American LaFrance Foamite Industries, Inc., American Mutual Liability Insurance Company, American Optical Company, American Red Cross, Associated Guard Manufacturing Company, Brown Shoe Company, R. H. Buhrke Company, E. D. Bullard Company, Chicago Eye Shield Company, Chicago Lloyds, Davis Emergency Equipment Company, Inc., C. H. Dockson Company, Duke Laboratories, Inc., Employers Mutuals, Holcomb Safety Garment Company, Hynson, Westcott and Dunning, Inc., Industrial Gloves Corporation, International Shoe Company, Justrite Manufacturing Company, Karel First Aid Supply Company, Walter Kidde and Company.

Lehigh Safety Shoe Company, Inc., Liberty Mutual Insurance Company, Lumbermens Mutual Casualty Company, Milburn Company, Mine Safety Appliances Company, National Safety Council, Oxygen Service and Equipment Company, The Patent Scaffolding Company, The Phister Manufacturing Company, Protective Equipment Inc., Protectoseal Company of America, Pyrene Manufacturing Company, Safety Engineering, Safety Equipment Service Company, Safety First Shoe Company, Shepherd Safety Shoe Corporation, Standard Safety Equipment Company, Sugar Beet Products Company, United States Department of Labor, Williams Jewelry and Manufacturing Company.

Paper Demand Little Changed

The Chicago paper market moves into the second week of May only slightly less retarded in activity. Local paper executives continue to feel that there will be a summer let-down followed by a resumption of the upward trend in the early Fall. However, because of the fact that the latter part of 1936 found mills running at capacity to meet demand, it is believed that the latter half of 1937 will probably produce little or no improvement as compared to the same period in 1936. The sulphite market remained about the same during the week, the fine paper grades in general giving little or no indication of a pronounced slowing up. Books and covers were in good demand, the latter, in particular, reported as showing a marked retention of strength. The kraft market continues strong with mills far behind and with kraft orders reported hard to place because of the scarcity. Ground woods were slightly buoyed up over the immediate future outlook. Newsprint was little changed. Waste papers were definitely less in demand than last week with old corrugated stock down somewhat as well as old news. Old krafts were reported strong. Shavings were moving into better demand.

Powell River to Export Pulp

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., May 7, 1937—Approximately $400,000 is now being spent at Powell River, B. C., by the Powell River Company, on plant installations and adjustments which will enable the company to produce dry unbleached sulphite pulp.

The Powell River Company is known as the major producer of newsprint in British Columbia, and will continue its operations in this direction, in addition to entering the export pulp field, according to Harold S. Foley, executive vice-president. A 120-inch Kamyr machine is now being installed to produce the pulp. The machine will have a production capacity of approximately 30,000 tons a year, and will for the time being operate at approximately 50 per cent capacity.

Mr. Foley announces that the company's change of policy and decision to produce pulp has been brought about by world-wide improvement in the pulp market. Much of its production will go to the Oriental market, it is understood.

James Whiting Heads Collins

[FROM OUR REGULAR CORRESPONDENT]

HOLYOKE, Mass., May 11, 1937.—Announcement was made the past week by the Collins Manufacturing Company, of North Wilbraham, of the election of James Whiting, of this city, as President of that organization and the election of his brother-in-law, Paul E. Bast, of Springfield, formerly of Philadelphia, as vice-president and treasurer. Mr. Whiting is the son of the late Samuel Raynor Whiting and of Mrs. Gertrude Whiting. Mr. Bast married Miss Margaret Whiting, daughter of Mrs. Gertrude Whiting.

★ ★ ★ ★

AND NOW!

The "NoPlug" Controller

PATENT APPLIED FOR

AGAIN BAKER SETS THE PACE WITH A 4-STAR FEATURE

THE "NoPlug" CONTROLLER . .

- . . . affords positive protection of drive mechanism
- . . . prevents abuse of motor, controller, batteries, tires and entire running gear
- . . . minimizes repair and maintenance costs
- . . . is standard on all new Baker Trucks

and

- . . . can be installed on all Bakers now in service.

The biggest slice of the repair and maintenance dollar on electric industrial trucks has always been traceable to the ability of truck-operators to shift instantly from full-speed-forward to full-speed-reverse (and vice versa)—a constant temptation and a constant threat to motors and driving mechanisms.

"PLUGGING" ELIMINATED

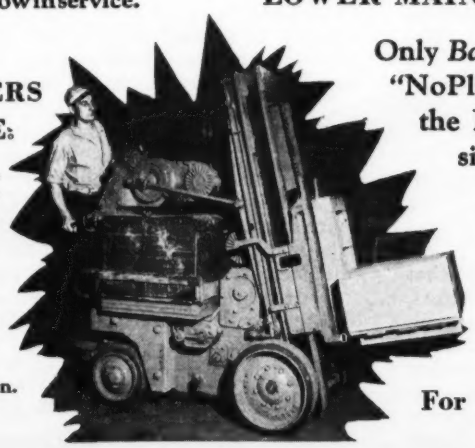
With the Baker "NoPlug" Controller, "plugging" is impossible . . . careful operation COMPULSORY. When the "NoPlug" is thrown from forward to reverse (or vice versa), nothing happens . . . no power is applied. The operator must bring the truck to an almost complete stop before power takes effect in the opposite direction. A definite interval in first speed is compulsory, insuring most effective and efficient use of current and insuring faster get-away.

LOWER MAINTENANCE COST ASSURED

Only *Baker* Trucks give you the protection of "NoPlug" Control. In combination with the Baker Duplex Compensating Suspension, (also exclusive), which cushions shock and eliminates strain between axles and frame, the "NoPlug" puts Baker Trucks far out in front in durability, low maintenance cost and uninterrupted operation.

BAKER OWNERS PLEASE NOTE:

The demand for "NoPlug" Controllers for replacement use is already taxing our production capacity. Orders are being filled strictly on a first-come, first-served basis. To avoid delay and disappointment later we recommend early action.



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The most economical way to handle material is NOT to HANDle it

Rising Labor Costs In Mills of Ontario

Union Wage Agreement Foreshadows Sharp Rise In Expenses — Wood Cutters Salaries May Also Increase Materially — Government Forestry Planes for Active Duty — W. J. Gage & Co. Introduce New Envelope.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., May 10, 1937.—Costs of pulp and paper companies operating in Ontario are believed likely to rise more sharply than was first indicated, as a result of the new union wage agreement completed in Toronto a few days ago. In addition to increased wages for mill workers, costs of labor for wood cutting operations are expected to rise. In Quebec mills the agreement does not apply, as unionization is not complete. But there is some expectation that efforts toward unionization of Quebec workers may become more aggressive from now on.

It is estimated by one well informed in the industry that by January 1, 1938, costs of producing newsprint in Ontario mills will be up $2 a ton on account of wages alone, as compared with costs at the opening of 1937. Another newsprint man predicts that efficient mills will do well to retain as earnings one-half of the increase of $7.50 a ton for newsprint in prospect for the first half of 1938. The benefit of the rise from $41 to $42.50 in the price per ton of newsprint for 1937 is practically eliminated by the rise of costs, particularly wage rates. Companies affected directly by the union wage agreement are Great Lakes Paper Company, Abitibi Power and Paper Company, Provincial Paper Ltd., Ontario Paper Company, Spruce Falls Power and Paper Company. It is expected that Minnesota and Ontario Paper Company will come under a similar wage arrangement.

Wage increases are effective from May 1, 1937, with a further general increase January 1, 1938. The advance in effect from May 1, 1937, range from 8 to 14 cents an hour. On January 1, 1938 there is to be a further increase of 2 cents an hour applicable to all classes of workers and an addition of one cent an hour for ordinary mill labor. The effect is illustrated by the increase paid to ordinary mill labor, which receives the minimum wage scale under the agreement. On May 1, 1937, the rate was raised from 43 to 51 cents an hour. On January 1, 1938, it rises to 54 cents an hour, which puts the rate back to war-time peak. In this class of labor, the full increase exceeds 25 per cent.

From the Operators' Viewpoint

Opinion among newsprint men appears to be that higher wages will also develop for wood cutters, adding to the rise of costs this year. As the more efficient mills have been operating at capacity, there is little further advantage to be gained in reduction of overhead from increased volume. Wage rates for Ontario paper mill workers will be approximately the same as those established for Northern Paper Company, major United States newsprint producer, through the international unions. Some Ontario mill operators suggest that complete similarity in labor rates with United States mills is discriminating because Canadian mills have to pay higher prices for such supplies as coal and machinery. The increases in mill wages in Ontario are not duplicated in Quebec paper mills, which are not as highly unionized. There is some expectations, however, that a drive for unionization in Quebec mills may develop with the effect of raising labor costs in that province.

Protect Pulp Limits in North

Twenty-five Government forestry planes will be on active patrol duty this year in the Northern Ontario pulp and forest country, it was announced at Queen's Park in Toronto this week. Special precautions are to be taken this season against the forest fire menaces. Within a month the radiotelephone service will be operating in the Patrecia, Red Lake, Nomad Lake and other inaccessible areas. The threat of fire has been noticed earlier this year due to unusually dry conditions in the north.

New Self-Seal Envelope Introduced

A new type of envelope designed to eliminate moistening the envelope flap has just been introduced by W. J. Gage & Co., Ltd., Toronto. The new envelope, which is available in sizes 7, 8, 9 and 10's, is known as Self Seal. The manufacturers have planned a series of folders showing printed samples of the new Self Seal envelope for distribution in the printing and stationery trades. The new envelopes are packed 250 and 500 to the box and are proving practical for commercial use.

Rushmore Paper Mill Destroyed

[FROM OUR REGULAR CORRESPONDENT]

GOUVERNEUR, N. Y., May 11, 1937.—Fire at the Rushmore Paper Mill at Natural Dam this week resulted in a damage estimated at $400,000. The plant is a total loss with only the brick walls of the machine room remaining. The mill employed about 165 persons and no plans for rebuilding have been announced. The converting department of the mill was burned completely. Defective wiring is believed to have started the fire which broke out while the night shift was at work. Employees formed a fire brigade and attempted to quench the flames although handicapped. Business files and office equipment were saved from destruction by the workers. It marked the second destruction of the mill by fire, the first occurring in 1920. The plant was rebuilt in 1923.

Executives to Meet at Neenah

A meeting on the executive committee of the general mill council of the Kimberly-Clark Corporation will be held at its offices at Neenah, Wis., May 17, 18 and 19. The management group and the employee representatives will hold separate caucuses, followed by a combined session at which matters of employment and working conditions will be discussed.

IN JORDAN FILLINGS . . .

MONEL POINTS TOWARDS $AVINGS

. . . *when mills obtain from 6 to 14 years of life from Monel fillings refining writing, bond, glassine and tissue stocks*

IN PLUG BANDS, TOO!

Note the Monel plug bands on this "Miami" jordan plug. Monel's high resistance to impact (120 foot pounds Izod) and resistance to corrosion assure that fillings are held firmly in place. Photo by courtesy of Shartle Brothers Machine Co.

THESE records speak for themselves. And Monel* jordan fillings in *your* mill will give you much the same performance, because:

1. **Monel is stronger and tougher than structural carbon steel.**
2. **Monel is stubbornly resistant to corrosion from paper stocks.**
3. **Monel fillings are furnished in minimum Brinell hardnesses of 165, 200, or 250.**
4. **Monel fillings are *uniform*.**

It's this unusual *combination* of properties that gives Monel its long life. Monel fillings do not chip or build up feather edges.

Write your jordan manufacturer: he's always glad to quote on Monel. Write us for your FREE copies of: "*Performance of Monel in Jordan Fillings*"; "*Monel in Pulp & Paper Mills*".

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MONEL

Scott Paper Reports $257,276 Net Profit

Earnings Equal to 45 Cents Per Share On Common Stock for Three Months—F. E. Macy Appointed Vice-President of A. M. Collins Manufacturing Co.—Garrett-Buchanan Co. Reports New Duties for C. R. Smith.

PHILADELPHIA, Pa., May 10, 1937—Scott Paper Company reports for the three months ended April 4, 1937, net profit of $257,276 after depreciation, federal and state income taxes, etc., equal to 45 cents a share on the 569,983 shares of common stock now outstanding. No provision was made for federal undistributed profits tax.

This compares with net profits of $234,601 for the three months ended March 29, 1936, equal after dividend requirements on the 7 per cent preferred stock then outstanding to 82 cents a share on 253,249 shares of common stock.

Current assets as of March 27, 1937, including $1,899,620 cash, amounted to $4,226,477 and current liabilities were $1,042,764. This compares with cash of $947,863, current assets of $3,352,395 and current liabilities of $699,970 on March 29, 1936.

Edward S. Wagner, vice-president and treasurer, states that with regard to the first quarter—"A 20 per cent increase in volume of business enabled the company to show higher earnings despite a rise in costs for materials, wages and salaries. Spot pulp prices are today double their 1932 low and 60 per cent higher than during the first quarter of 1936."

Net sales were $3,448,566 the current quarter, against $2,861,297 a year ago.

New Mould Made Cover

Raymond & McNutt Company are distributing a sample book of the new Mould Made Cover, manufactured by Hurlbut Paper Company, South Lee, Mass. Mr. Charles Cook, vice-president in charge of sales, in commenting on this new cover stock, says: "Mould Made Cover—as its name signifies—is made in individual sheets by a special process which produces a surface and texture closely resembling hand made papers. Mould Made Cover is a strong, durable sheet, free from grain, unlike ordinary cover papers. This increases its flexibility from a printing standpoint. It is made in white and five beautiful colors, cream, gray, sea green, Imperial blue and bronze. To further insure protection to the deckles on Mould Made Cover, it is packed 250 sheets to the carton instead of being wrapped in the usual way."

Raymond & McNutt Company are also exclusive distributors in Philadelphia for Thos. N. Fairbanks' line of imported book and cover hand made and mould made papers. Included in this line are imports from historic old paper mills in England, France, Italy and Japan, all of which have had a noteworthy existence in the field of paper making; for instance, that which comes from England is manufactured by Portals, Ltd., who make money for The Bank of England.

F. E. Macy Joins Collins

A. M. Collins Manufacturing Company announce the appointment of Frederick E. Macy as vice-president in charge of sales, succeeding Robert C. Fay, resigned. Mr. Macy, who until recently was sales representative for Dill & Collins, Inc., in Philadelphia, has been connected with the paper industry for a number of years, particularly in the book paper field.

Mr. Fay, who joined the A. M. Collins Manufacturing Company about a year ago and is well known in the paper industry, has not announced his plans for the future.

C. Raymond Smith's New Post

Garrett-Buchanan Company report that C. Raymond Smith, one of their vice-presidents, who is in charge of the company's division in Reading, has also been placed in charge of the Charles W. Beers & Co. Division, 7 East Lombard street, Baltimore, Md. Mr. Smith will devote his activities between these two divisions.

G-E Traveling Switchgear

A traveling exhibit of the most recently developed switchgear equipment, sponsored by General Electric, and featuring working models of oil-blast circuit breakers and various types of metal clad switchgear, opened at the Hotel Ambassador, New York, May 3. Designed as a practical demonstration of the advantages of modern circuit-interrupting apparatus, the exhibit will be shown to leading executives in key cities throughout the country. Models of large metal-clad equipment are utilized to show how this type equipment promotes safety and convenience through mechanical interlocking and factory assembled units.

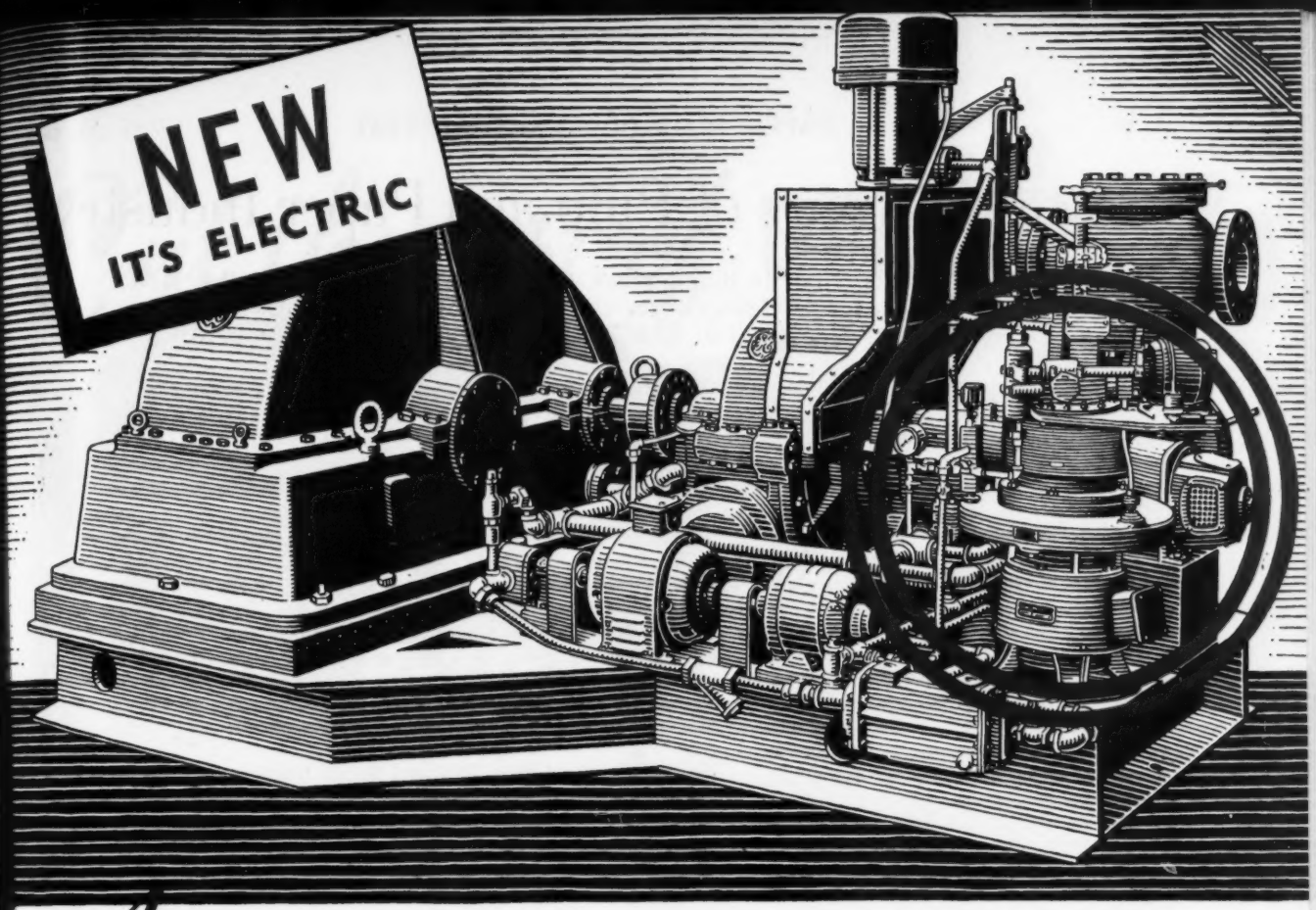
Book and Fine Paper Meeting

Past President Charles Champion, who will serve as chairman of the Book and Fine Paper Group meeting at the Eighteenth Annual Convention of the American Pulp and Paper Mill Superintendents Association, June 23, 24 and 25, Industrial Arts Building, Springfield, Mass., has announced the following program for his meeting:

"Description of the Jones-Bertram Patent Beaters" by George H. Spencer, E. D. Jones & Son Company; "Evolution of Sized Paper Drying," by Frank W. Partsch, J. O. Ross Engineering Corporation and "Clean Papers" by F. K. Becker, Bird Machine Company.

Safety Suggestions

Two employees of the Kimberly-Clark Corporation's mill at Kimberly, Wis., will be given a free trip to the Fox River Valley and Lake Shore Safety Conference at Oshkosh, Wis., May 20, in a contest which was to close May 10. Those who furnish the best safety suggestions will have their expenses paid for the trip. The suggestions must point to unsafe practices by employees or unsafe machinery or equipment at the mill. Three judges will review the communications and select the best two.



Announcing a Revolutionary

New Speed Control for Paper-Machine Turbines

HERE is the most important advance in speed control ever developed for paper-machine turbines. Never before has it been possible to obtain the operating advantages resulting from the use of this new G-E governor design.

Precision Speed Control

Speed "drift" and poor regulation due to temperature changes are completely eliminated in the new electric governor. Paper breakage traceable to governing no longer prevails. The ability of the governor to hold constant speed is independent of its speed range. Constant speed is maintained irrespective of changes in initial steam pressure, superheat, back pressure, or load. You know the speed is right—your product shows it.

Speed Range

With the new electric governor it is possible to design for any speed range up to 24 to 1. Many different weights of paper can be more readily produced on the same machine. Job-mill operators will find this feature a profitable solution of their below-normal production period problem.

Simple Operation

Operation of the new governor is extremely simple. A single push-button station is the only manual control. Speed changes are made from this station quickly and easily.

Tested in Factory and in Service

This governor has been completely tested in the General Electric small-turbine factory. Installations which have been made to date show results which have been highly satisfactory to plant operators.

If you have a governing problem, it will pay you to investigate the new G-E paper-machine turbine governor. The turbine specialist at your nearest G-E office can supply further information. Or write for Bulletin GEA-2615. General Electric, Schenectady, N. Y.

720-276

GENERAL ELECTRIC

Financial News of Pulp and Paper Industry

Reorganization Plan Is Being Worked Out for Abitibi — Union Bag Reports Net Income of $326,917 for the First Quarter — Southern Kraft Corp. Reports Net Profit of $5,637,469 for Year Ending Dec. 31, 1936.

New York Stock Exchange

High, Low and Last for the Week Ending May 13, 1937

	High	Low	Last
A. P. W. Paper Co.	7⅜	7⅜	7⅜
Armstrong Cork Co.	65½	57½	59
Celotex Corp.	41¾	40½	41
Celotex Corp., pf.	77½	76	76½
Certain-Teed Products Corp.	17⅛	15½	15¾
Certain-Teed Products Corp., pf.	71	67½	67½
Champion Paper & Fibre Co.	57½	55	55
Champion Paper & Fibre Co., pf.	109¼	108	108
Congoleum Nairn Co.	39½	37¾	38½
Container Corp. of Amer.	36	31½	32⅛
Continental-Diamond Fibre Co.	21¾	20½	20½
Crown Zellerbach Co.	21	19⅜	19½
Crown Zellerbach Co. cum. pf.	104	101	101
Flintkote Co.	34	32⅞	33⅞
International Paper & Power (a)	18⅞	17⅝	17⅞
International Paper & Power (b)	13½	12¾	13¼
International Paper & Power (c)	7⅛	6⅝	6⅞
International Paper & Power, pf.	107	101	102
Johns-Manville Corp.	131¾	129	129
Johns-Manville Corp., pf.	124	122	124
Kimberly-Clark Corp.	42¾	41½	41½
Masonite Corp.	59	56¼	57
Mead Corp.	29	27½	28
Mead Corp., pf.	95	93½	94
Paraffine Companies, Inc.	74	71	71
Scott Paper Co.	41	40	40
Sutherland Paper Co.	36⅝	36½	36½
Union Bag & Paper Corp.	83¾	79¾	80½
United Paperboard Co.	14⅜	13	13⅜
U. S. Gypsum Co.	116	109½	109½
U. S. Gypsum Co. pf.	156⅝	156	156

New York Curb Exchange

High, Low and Last for the Week Ending May 13, 1937

	High	Low	Last
American Box Board Co.	22½	21	21
Brown Co., pf.	71	66½	66½
Great Northern Paper Co.	41	40	40
St. Lawrence Corp.	12	12	12
St. Regis Paper Co.	10¾	9⅛	9¼
St. Regis Paper Co., pf.	107	106½	107
Taggart Corp.	13	12	12

Reorganization Seems Near

Abitibi Power and Paper Company Protective Committees have been giving intensive attention to working out a reorganization plan which will permit the company's emerging from receivership and bankruptcy. Joseph P. Ripley, New York chairman of the bondholders committee, was in Toronto for a few days last week and took part in long discussions which tackled the problem as it has never been tackled before. The company, during receivership, has cleared away a number of obstacles to reorganization, including more than four million dollars owed to banks in 1932, millions of dollars in purchase money obligations to get full control of Thunder Bay Paper Company, readjustment of its limits with the Department of Lands and Forests, and adjustments with the Hydro-Electric Power Commissions of Ontario and the Government of various claims in connection with power and timber dues.

In reorganizing it would appear as if the company must first seek to provide itself with many millions of dollars as working capital so that this huge industry may not be hampered in its preparations for taking any business that offers. Then come the first mortgage 5 per cent bondholders with $43,300,000 of bond interest unpaid since 1932. The Abitibi bonds, which were selling at one-fifth of par a few years ago, have recently been selling above par, a sign of the confidence of holders that earnings in 1937 will be considerably larger than the $2,200,000 shown in 1936 as available for depreciation, depletion and bond interest.

The real expectation is for 1938 when $50 a ton will be obtained for newsprint instead of the $42.50 a ton recently obtained. Against these expectations are the facts that labor and material costs were greater in 1936, and that recent wage increases will make the costs even larger for 1937. It is anticipated, however, that the company will be able to earn sufficient, at least to pay after depreciation, depletion and taxes, the bond interest and whatever interest will be required on any security issued to take care of the arrears of bond interest.

Union Bag Earnings

Union Bag and Paper Corporation for the three months ended March 31 reported net income of $326,917 equal to $1.25 per share on 263,860 shares of common stock outstanding, according to the quarterly report being sent to stockholders by Alexander Calder, president. This compares with net profit of $57,550, or approximately 22c per share, in the corresponding quarter a year ago.

Southern Kraft Corp. Makes Good Report

The Southern Kraft Corp., has just issued the following financial statement for the year 1936:

STATEMENT OF PROFIT AND LOSS AND EARNED SURPLUS

For Year Ended December 31, 1936

Sales and Other Income:			
Gross sales, less returns, allowances and discounts—			
Customers	$29,532,614.14		
Affiliated and subsidiary companies	4,421,742.67	$33,954,356.81	
Other income—net (see summary)		262,909.64	$34,217,266.45
Cost and Expenses:			
Cost of sales—			
Pulpwood, labor, materials, etc. (see note 5)		$16,450,018.64	
Maintenance and repairs		2,249,346.18	
Taxes (other than income taxes)		456,171.59	
Outward freight and delivery expenses		4,379,718.43	
Selling, general and administrative expenses (see note 5)		1,212,395.45	
Provision for doubtful accounts		65,003.50	24,812,653.79
			$9,404,612.66
Deductions:			
Interest to public—			
Funded debt	$254,774.26		
Other debt	50,147.62	$304,921.88	
Interest to parent company—			
Funded debt	$362,886.95		
Income notes	361,467.91		
Other debt	977,602.88	1,701,957.74	
Amortization of debt discount and expense		71,196.51	
Depreciation (see note 6)		788,140.90	
Provision for Federal normal and state income taxes		880,926.00	3,747,143.03
Net Profit for the Year			$5,657,469.63
Earned Surplus—January 1, 1936			46,378.04
			$5,703,847.67
Deduct:			
Write-down of non-operating mill to nominal value		$179,334.91	
Premium paid on Bastrop Pulp & Paper Company bonds redeemed		5,854.00	
Dividends paid		4,814,661.47	4,999,850.38
Earned Surplus—December 31, 1936			$703,997.29

Cut the cost of OPACITY...

in your BOOK STOCKS and the like by using the new TITANOX B-30

GREATER opacity at no greater cost... that in a nutshell is the story of Titanox-B-30, a super Titanox-B an even better white pigment.

It is named Titanox-B-30 because it contains thirty per cent of Titanium Dioxide—five per cent more than the regular Titanox-B. From this increase in Titanium Dioxide comes a proportional intensification of the opacity, whiteness and brightness which this new pigment gives to paper stocks.

Titanox-B-30 (Titanium Barium Pigment) is especially applicable to sheets of medium ash content, to book papers, coated papers, lined board—in fact, wherever moderate loading is permissible.

Relatively small amounts of this modern filler minimize show-through, and effectively mask discoloration caused by other constituents of the paper. Because of its chemical inertness and stability, it will not yellow or darken. Its extreme fineness and ease of dispersion make for superior working qualities and better printing surfaces.

Where high opacity with lowest loading is desired, Titanox-A (Titanium Dioxide) is recommended.

Consult our Service Department for detailed advice on the use of Titanox pigments. Our technicians will be glad to cooperate with you.

TITANIUM PIGMENT CORPORATION

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111 Broadway, New York, N. Y.; Carondelet Sta., St. Louis, Mo.; National Lead Co. (Pacific Coast Branch), 2240 24th St., San Francisco, Cal.

TITANOX

TRADE MARK

BALANCE SHEET OF SOUTHERN KRAFT CORP.—DECEMBER 31, 1936

ASSETS

Capital Assets (see note 1):		
Plants and properties, development costs and other intangibles	$37,816,553.03	
Less: Reserve for depreciation, including $4,487,006.27 representing reinstatement in property account and in depreciation reserve of depreciation accrued prior to date of acquisition	8,697,474.08	$29,119,078.95
Woodlands, less stumpage credits		4,784,439.08
Investments—		
In subsidiary companies (at cost)	$857,103.47	
Miscellaneous securities, at cost less amounts charged off (including $250,015.45 pledged under First Leasehold and General Mortgage Bonds)	377,588.43	1,234,691.90
Total		$35,138,209.93

The amounts at which plants and properties, woodlands and investments are stated do not purport to represent realizable values.

Current Assets:			
Cash		$752,701.83	
Accounts and notes receivable	$5,080,852.19		
Less: Reserve for doubtful accounts	345,818.82	4,735,033.37	
Inventories—quantities and condition determined by the Company—			
Finished products, including consignments (at direct cost of manufacture)	$1,336,443.66		
Operating and repair materials and supplies (at cost)	2,244,940.48		
Pulpwood at mills (at delivered cost)	247,566.83		
Cash advances for logging operations	106,944.66	3,935,895.63	9,423,630.83
Deferred Assets and Expenses:			
Receivables not currently due		$283,220.17	
Due from officers and employees		5,640.33	
Prepaid insurance and taxes		45,003.94	
Deferred charges applicable to future operations		112,751.12	
Unamortized debt discount and expense		721,925.76	1,168,541.32
			$45,730,382.08

LIABILITIES

Funded Debt (see note 2):			
First Leasehold and General Mortgage Bonds, 4¼% Series, due 1936		$14,500,000.00	
Less: Amount in treasury		606,000.00	$13,894,000.00
Louisiana Pulp and Paper Company First Mortgage 5% Bonds, due January 1, 1950		$1,619,000.00	
Less: Amount in treasury, pledged as collateral to First Leasehold and General Mortgage Bonds		1,619,000.00	.....
Purchase money mortgage note, due 1938 to 1942			149,711.49
Total			$14,043,711.49

See note 1 as to lien of International Paper Company First and Refunding Mortgage on certain of the properties.

Current Liabilities (exclusive of amounts owed to parent company):			
Accounts payable		$908,122.47	
Accrued taxes, payrolls and other expenses		1,518,219.20	
Accrued interest		49,207.91	
Serial obligations payable in 1937		30,000.00	2,505,549.58
Due to International Paper Company, parent company:			
6% income notes due January 1, 1937		$17,251,837.12	
Open account		1,426,805.52	18,678,642.64
Reserves:			
Reserve for unrealized profit on paper sold to affiliated companies and included in their inventories			33,899.24
Capital Stock and Surplus:			
Capital stock, no par value—			
Authorized and outstanding 100,000 shares at		$7,000,000.00	
Surplus—			
Paid-in (see note 3)	$2,764,581.84		
Earned	703,997.29	3,468,579.13	10,468,579.13
Contingent Liabilities (see note 4)			
			$45,730,382.08

SUMMARY OF OTHER INCOME—YEAR ENDED DECEMBER 31, 1936

Interest:		
Subsidiary companies	$10,477.94	
Other	45,794.00	$56,271.94
Dividends:		
Subsidiary company	$80,000.00	
Other	40,692.00	120,692.00
Cash Discount on Purchases		47,071.60
Miscellaneous (net)		38,874.10
Other Income—Net		$262,909.64

EXPLANATORY NOTATIONS TO FINANCIAL STATEMENTS FOR YEAR ENDED DECEMBER 31, 1936

1. CAPITAL ASSETS:

Plants, properties and woodlands, including development costs and other intangibles, are stated at cost of acquisition of $24,619,472.75 in 1930 (paid for by the issuance of notes and 40,000 shares of no par value capital stock and the assumption of funded debt), plus $4,487,006.27 representing reinstatement in property account and in depreciation reserve of depreciation accrued prior to the date of acquisition, and plus the cost of subsequent additions and acquisitions, less retirements. The properties acquired in 1930 were purchased from International Paper Company, Parent Company, and a subsidiary thereof, and the purchase price paid by the Company was identical with the cost to those companies, which represented cash paid, liabilities assumed and par value of securities issued, including approximately $650,000 by which the par value of securities issued to an affiliated company exceeded the cash purchase price paid by that company for certain of the properties.

In addition to the various liens of its own funded debt, certain plants and properties of the Company, namely the Bastrop, Camden, Louisiana and Moss Point mills together with their appurtenant woodlands are subject to the lien of the indenture dated January 1, 1917 securing the First and Refunding Mortgage 5% Bonds, due 1947, of International Paper Company, Parent Company ($14,886,000 outstanding at December 31, 1936). That company has executed an agreement to indemnify Southern Kraft Corporation from all liability, loss or damage in connection with said bonds and indenture.

2. SINKING FUND REQUIREMENTS:

There will be required for sinking funds in 1937, deposit of $294,000 in cash or principal amount of bonds, in addition to bonds held by the Company for this purpose at December 31, 1936. Funded debt maturities in 1937 are included under current liabilities.

3. PAID-IN SURPLUS:

Paid-in surplus of $2,764,581.84 represents the excess of the face amount of 7½% demand notes and other indebtedness of the Company surrendered by International Paper Company, Parent Company, in August, 1936, over the amount of cash paid, face amount of 6% income note and stated value of capital stock issued in exchange therefor.

4. CONTINGENT LIABILITIES:

Surety bonds in the aggregate amount of $821,000 deposited with the United States Department of Customs in connection with the importation of salt cake.

The Company had commitments aggregating approximately $3,000,000 at December 31, 1936 in connection with the construction of a new kraft board mill. Under agreements executed in December, 1936, the estimated amount of funds required for financing this construction, other than amounts available out of the Company's current funds, are to be advanced to the Company by International Paper Company, Parent Company, from the proceeds of its notes to be issued to banks which are payable over a period of years and are to be secured by a mortgage on the new mill.

5. PRORATION OF PARENT COMPANY EXPENSES:

It is the practice of International Paper Company, Parent Company, to pay certain manufacturing and general administrative salaries and expenses applicable both to its own operations and to many of its subsidiaries and to prorate such salaries and expenses to its own mills and to such subsidiary companies, principally on the basis of normal productive capacity. There are no formal agreements covering these arrangements under which the expenses prorated to the Company on the above basis for the year ended December 31, 1936 were as follows:

Manufacturing administration (charged to Cost of Sales)	$168,838.54
General and administrative expenses	460,089.62

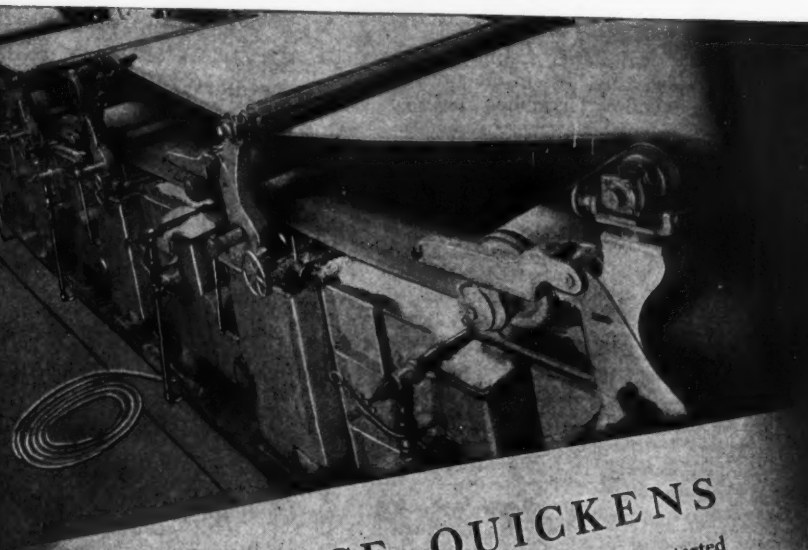
6. DEPRECIATION POLICY:

For the year 1936 the provision for depreciation is the amount determined by the management of the Company as necessary to amortize the depreciated cost at January 1, 1936, within the estimated remaining life of each property. Depreciation deductions taken in Federal income-tax returns are in excess of the annual provisions recorded in the books and reflected in financial statements.

Gair Changes Approved

Stockholders of the Robert Gair Company, Inc., approved a reduction in the company preferred stock from $560,000 to $200,000 and a change in value from no par to $10 a share. The common stock was changed from no par to $1 par stock. The company also transferred $447,057 from earned surplus to capital surplus to comply with a suggestion of the committee on stock list of the New York Stock Exchange.

The change was undertaken to permit payment of dividends from earnings in the event the company should not have an earned surplus. Counsel for the company explained that the previous provisions would have barred dividends even though the company was earning money and would thus make it subject to the surtax on undistributed profits.



THE PACE QUICKENS

The sale of the new Black-Clawson super-cylinder machine started slowly, as was only natural. But with two or three in service and their phenomenal results available for study, the pace began to quicken.

At this very moment a Black-Clawson machine of this particular type is being installed and others are being built.

The pace naturally would quicken as it gradually dawned on sharp-witted paper makers that with this machine they could:

Exercise a substantial amount of control over the formation of their papers, both machinewise and across.

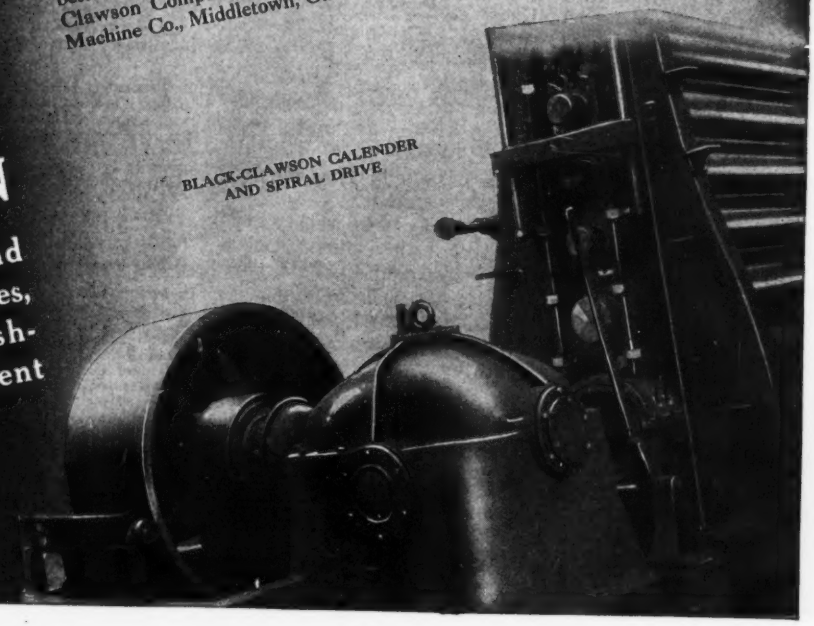
Make their papers smoother, give them better finishes and improve their printing qualities.

Extract water faster and hence run faster, other mill conditions permitting.

Reduce their felting costs from ⅓ to ½ and eventually pay for the installation on this economy alone.

Yes, the pace has quickened. It is always so with machinery that does better work, does it faster, and also more economically. The Black-Clawson Company, Hamilton, Ohio. Owners of Shartle Brothers Machine Co., Middletown, Ohio.

BLACK-CLAWSON CALENDER AND SPIRAL DRIVE



BLACK-CLAWSON

Super-Cylinder and Fourdrinier Machines, Drives and Finishing End Equipment

Canadian I. P. Reports Loss

The Canadian International Paper Company and subsidiary Companies report a net loss in their financial statement for the year ending December 31, 1936, of $1,836,966.76. The financial statement is as follows:—

CONSOLIDATED STATEMENT OF PROFIT AND LOSS AND DEFICIT
For Year Ended December 31, 1936

Sales and Other Income:		
Gross sales, less returns, allowances and discounts...		$46,067,503.71
Other income—Net		115,326.11
		$46,182,829.82
Cost and Expenses:		
Cost of sales:		
Pulpwood, labor, materials, etc.....	$25,857,983.73	
Maintenance and repairs.....	2,773,506.34	
Taxes (other than income taxes)..	587,807.55	
Outward freight and delivery expenses	6,937,706.79	
Selling, general and administration expenses	2,771,291.90	
Provision for doubtful accounts.....	17,979.86	38,946,276.17
		$7,236,553.65
Deductions: Interest on obligations of of subsidiary companies.....	$1,920,816.15	
Interest of Canadian International Paper Company:		
On first mortgage bonds and prior liens	1,349,107.64	
On other obligations.....	2,144,591.52	
Amortization of debt discount and expense	375,346.94	
Depreciation	2,165,288.00	
Depletion	613,325.88	
Profits tax of subsidiary companies..	644.28	
Undeclared dividends for 1936 on preference shares of subsidiary company	504,400.00	9,073,520.41
Net Loss for Year		*$1,836,966.76*
Profit on Bonds and Debentures redeemed during 1936		125,498.94
		$1,711,467.82
Deficit—January 1, 1936		*8,465,950.35*
Write down to nominal or estimated realizable values, of certain non-operating plants and properties, woodlands and investments		*2,828,884.59*
Deficit—December 31, 1936		*$13,006,302.76*

CONSOLIDATED GENERAL BALANCE SHEET OF CANADIAN INTERNATIONAL PAPER CO. AND SUBSIDIARY COMPANIES—December 31, 1936

ASSETS

Capital Assets:		
Plants and properties, water power rights, development costs and other intangibles	$120,953,903.02	
Less: Reserves for depreciation.....	20,220,129.17	$100,733,773.85
Woodlands less depletion and other credits.....		20,407,508.31
Total (at cost of construction or acquisition to this consolidation less reserves, including $670,267.16 by which the book investments in stocks owned exceed the net assets applicable to such stocks as shown by books of subsidiaries at dates of acquisition)		$121,141,282.16
Investments (book value):		
Dominion of Canada bonds on deposit with Provincial Government (par $10,000)	$9,662.50	
Shares pledged as part collateral for funded debt	20,000.00	
Other	21,416.00	51,078.50
Total		$121,192,360.66
Current Assets (Partly pledged under Bank Acts of Canada and Newfoundland and as security for 5% secured notes):		
Cash	$864,347.40	
Accounts and notes receivable:		
From affiliated companies for sales of newsprint and pulp:		
International Paper Company $129,875.29		
International Paper Sales Co., Inc... 6,760,588.89		
$6,890,464.18		
From others (less reserves for doubtful accounts) 1,694,066.69	8,584,530.87	
Inventories	15,792,562.83	25,241,441.11
Due from Affiliated Companies		75,547.39
Deferred Assets and Expenses:		
Sinking funds and restricted deposits	$229,421.85	
Accounts and notes receivable, not currently due:		
From affiliated company $239,861.53		
From others..... 97,712.92	337,574.45	
Prepaid insurance and taxes.....	109,130.12	
Depletion applicable to pulpwood in inventory	966,051.05	
Deferred assets and charges applicable to future operations	152,387.93	
Unamortized debt discount and expense	4,513,924.74	6,308,490.14
		$152,817,839.30

LIABILITIES

Funded Debt		$86,116,235.00
Current Liabilities:		
Bank loans—secured.....	$674,000.00	
Accounts payable:		
To affiliated companies for December purchases of power.....	208,363.28	
To others	2,249,602.10	
Accrued payrolls, stumpage dues and other expenses.....	1,861,335.55	
Accrued taxes (including provision for municipal taxes in dispute)..	694,039.87	
Accrued interest	366,913.45	
	$6,054,254.25	
5% Secured Notes of Canadian International Paper Company due various dates to April 21, 1937 given to International Paper Company for advances	5,000,000.00	11,054,254.25
Due to International Paper Company—including $6,382,900.44 of deferred and accrued interest on bonds and secured notes.....	$11,099,842.41	
Due to Canadian International Paper, Limited	919,156.40	12,018,998.81
Reserves:		
Unrealized profit on newsprint and pulp sold to affiliated companies and remaining in their inventories	$346,398.66	
Sterling exchange conversion.....	98,314.31	
Other	244,341.03	689,054.00
Preference Shares of Subsidiary Company—including dividends accrued but not declared		12,105,600.00
Capital and Surplus:		
Capital Stock, $100 par (authorized and outstanding 100,000 shares)	$10,000,000.00	
Surplus—paid in	33,840,000.00	
Less: Deficit	*13,006,302.76*	30,833,697.24
		$152,817,839.30

In the above balance sheet at December 31, 1936, foreign accounts are stated on the basis of $4.85 for the pound sterling and at parity of exchange for Canadian and United States currencies without adjustment of differences. It is the practice of the companies to reflect in current operations any differences between these rates and the current quotations at the time funds are actually purchased or transferred. The obligation expressed in the bonds to make payment in Canadian or other gold coin has been taken at face amount.

Approved on behalf of the Board:—V. M. Drury, Director. John H. Hinman, Director.

Badger Paper Listing

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 26, 1937 — Arrangements are being made to list the stock of Badger Paper Mills, Inc., Peshtigo, Wis., on the Chicago Stock Exchange. A committee of three members from the board of directors is authorized to consummate the plan, subject to counsel for the company. The company is operating its mill at capacity, and reports first quarter earnings substantially over those of the first quarter a year ago.

National Container Profits

The National Container Corporation reports for March quarter: Net profit, $99,201, equal to 64 cents each on 155,482 shares of $1-par stock outstanding at close of period, against $30,326, or 20 cents a share, a year before based on present capitalization.

Spachner on Container Board

J. V. Spachner, president of Pioneer Paper Stock Corporation, Chicago, has been elected a director of Container Corporation of America to succeed Early A. Wagonseller, secretary of Container, who has resigned. Pioneer Paper is a subsidiary of Container Corporation.

REORGANIZATION OF I. P. & P. C. PROPOSED

(Continued from page 21)

While stating that it in no way vouched for such estimates, the commission added:

"Elimination of the deficit by some means or other is thus a prerequisite of the possibility of prompt resumption of any dividends. If such elimination is not effected, it is estimated that it would require earnings of $10,000,000 per year for a period of almost three years, after allowing for the payment of undistributed-corporate-profits tax, before dividends could be resumed upon the preferred stock."

Investors' Bargaining Seen

The commission characterized the proposed plan as, in essence, a proposal that the holders of preferred and common stocks shall enter into a bargain, with the common stockholders insisting that the preferred stockholders make concessions.

"By intimating," the report said, "that the proposed plan represents, in substance, a bargain between common stockholders and preferred stockholders, the commission does not intimate that the plan is unfair. Indeed, in plans of this character there is no absolute standard by which fairness or unfairness can be measured. The question must be resolved in the light of a judgment by each class of stockholders as to whether what they give up is worth what they receive. Meanwhile, it is important to recognize that the proposed plan, independent of the fairness of the bargain between common stockholders and preferred stockholders, has certain other advantages. Chief among these is the simplification of capital structure that will be brought about and the consequent possibilities of further financing by the company due to this simplification."

The plan proposed, the commission said, was formulated by a committee representing interests which owned 14.5 per cent of the outstanding preferred stock, 43.1 per cent of the A common, 61.6 per cent of the B common and 48.1 per cent of the C common stock, with the Phipps interests and the Chase National Bank the largest holders of common shares. The others represented by the committee were listed as the United Light and Railway Company, the American Light and Traction Company and the Albert Wiggin family.

All Holders Urged to Vote

The commission emphasized the importance of all stockholders voting their stock, pointing out that under the unusual provisions of the company's declaration of trust, the holdings of this group, which "can be expected to vote in favor of the plan," might otherwise constitute the votes necessary for approval. The commission also urged the stockholders to consider how the percentage of voting power in the company is affected by the plan.

Upon adoption of the plan, the commission ascertained, the company would have almost twice as many shares of common stock as it will of preferred, and if in the future any cleavage of interest should develop between the two classes of stock, the balance of voting power would always be held by the new common stock as a class, as against the new preferred stock as a class.

Dealing with its jurisdiction in the case, the commission said that among the indirect subsidiaries of International Paper and Power when the Public Utility Holding Company Act became effective was the New England Power Association, thus making I. P. and P. a holding company under the statute.

The voting stock of the New England Power Association which I. P. and P. held was put into a voting trust, and an application was filed by I. P. and P. for exemption from the act. The commission was unwilling to pass hastily upon the use of the voting-trust device, and it felt also that a ruling might involve some issue in connection with test cases pending on the validity of the statute.

Pointing out that although the application for exemption gave I. P. and P. temporary exemption under commission's rules pending a decision, the company desired to remove any "cloud" by submitting its recapitalization plan for a report, the commission said:

"We obviously do not have the right to extend the benefits of the act, which Congress has bestowed on registered holding companies and their subsidiaries, to companies which have not registered.

"Nevertheless, it would be absurd if there were no procedure within the framework of the act to permit the applicant, in the light of the foregoing considerations, to continue its normal course of business when the applicant is not defiant of the law, but, according to its lights, is trying to comport itself with the law. It would indeed be tragic if the administrative procedure were so impotent and so flexible that we should be powerless to effect a practical solution of a practical problem."

Authority Under Sec. 20

Finding its authority under Section 20, which authorizes the commission to make and issue such orders as it may deem necessary or appropriate to carry out the provisions of the act, the commission said:

"Administrative law and procedure must, of course, be fair; it also must be eminently practicable, and thus must have within it the capacity to adapt itself to the exigencies of the situations upon which it operates. To interpret our powers under our fundamental act with undue strictness at this stage in our growth would be to sacrifice upon the altar of bygone legal formalities our ability to perform adequately our allotted task."

Stating that the only evidence on the record of the present value of the applicant's assets indicated that the A common stock was worth virtually nothing and the B and C common stocks absolutely nothing, Commissioner Healy, dissenting, declared that "the only excuse for the treatment proposed for the common is its nuisance or obstructive value."

"In sum," Mr. Healy said, "it seems to me that the common stockholders, despite the disadvantages of an inferior position both as to legal rights and trading material, are offered a standing under the plan to which they are not fairly entitled. No doubt they are in a position to exact some tribute by refusing to promote any plan not to their liking and no doubt many preferred stockholders, in their eagerness or pressing need for some return on their in-

vestment, will submit to unfairness as preferable to further delay.

"It is difficult to observe without some concern the extent to which stockholders in many companies, who in good faith believed they were paying their money for a genuinely preferred position, have through reorganization of perfectly solvent companies, such as this, through the bargaining leverage of common stock holdings been euchred, cajoled, coerced, elbowed and traded out of their legal rights. Although we must recognize that often, especially in failing enterprises, various changes in stockholders' rights and various concessions become necessary, nevertheless, it seems to me, there should be an emphatic recognition that the terms of preference stated in preferred stock certificates mean what they say. If not, it should not be permitted that they be called 'preferred.'"

Commissioner William O. Douglas, concurring in the majority report, added, however, that the plan "has many of the earmarks of a plan prepared (as well as conceived and proposed) by a management interested in the common stock, rather than a plan prepared as a result of arm's-length negotiations between preferred and common."

"In fact," he added, "it seems unlikely that preferred stock normally would be agitating for such a plan, at least until it was more easily predicted whether earnings which lie immediately ahead represent a plateau or a peak."

He felt that the procedure of having such plans subjected to impartial scrutiny and to approval of the preferred stockholders in the negotiations was essential "lest the strategic position of the management, reinforced as it is by charter provisions or by corporation law, be employed oppressively."

Recapitalization Plan

The International Paper and Power Company's recapitalization plan would cut capitalization approximately $29,200,000, wiping out the present capital deficit of $20,000,000 and leaving a surplus. It would also eliminate arrears of $40 a share on the 7 per cent preferred stock and of $34.25 on the 6 per cent preferred stock. These aggregated $36,678,725 at the end of 1936. Holders of preferred shares have been told that they would be compensated for loss of the accumulated dividends by obtaining control of the company.

Under the plan, the company would give one share of new $100-par 5 per cent convertible preferred stock and one share of new $15-par common for each share of 7 per cent preferred; and one share of new 5 per cent preferred and one-quarter share of new common for each share of 6 per cent preferred. Junior classes of stock would receive fractions of shares of new common, with warrants to buy other fractions.

To pass, the plan requires a two-thirds majority of each of the five classes of stock now outstanding.

I. P. Directors Approve Plan

The board of directors of International Paper and Power Company has unanimously approved the proposed plan for change in capitalization for submission to shareholders at the annual meeting to be held in Boston on June 23, it was announced by R. J. Cullen, president of the company, following a meeting on Tuesday of this week. Mr. Cullen said:

"Our Board of Directors has unanimously approved the Plan for Change in Capitalization for submission to shareholders at the annual meeting and unanimously recommends its adoption by the shareholders. The Directors voted to set June 23 as the date for the annual meeting and May 21 as the date as of which shareholders of record will be entitled to vote at the meeting. It will take several days to complete the papers for mailing, but formal notice of the meeting will go forward to our shareholders under date of May 15."

St. Regis Grants Wage Increase

[FROM OUR REGULAR CORRESPONDENT]

DEFERIET, N. Y., May 11, 1937.—Announcement is made here of the granting of a wage increase averaging about 12½ per cent to approximately 1,800 employes of the St. Regis and Taggart group of paper mills. Conferences were held here this week at which officials of the company and union representatives were present. The increase affects 18 plants affiliated with the company and becomes effective on May 1. It is understood that the wage advance will result in adding about $125,000 to the annual payrolls of the mills. Unions represented at the conference included the International Brotherhood of Papermakers; International Brotherhood of Pulp, Sulphite and Paper Mill Workers; International Brotherhood of Carpenters and Jointers; International Brotherhood of Firemen and Oilers; International Brotherhood of Electrical Workers and the International Association of Machinists.

I. P. Not to Build Newsprint Mill

In response to inquiries the following statement was made today by the management of International Paper and Power Company.

"No company affiliated with International Paper and Power Company is considering the construction of a newsprint mill in the south. As announced last March orders have been placed by Southern Kraft Corporation for machinery to be installed in another new kraft board mill, but no final decision has yet been reached as to the location of this mill."

New Paper House Opens

[FROM OUR REGULAR CORRESPONDENT]

NORRISTOWN, Pa., May 10, 1937—A new paper house has just opened under the name of the Montco Paper Products. Organized by Thomas L. Baldwin, the new firm will deal in wrapping and kindred paper products. A warehouse has been leased and with its new adequate handling facilities, the company plans to specialize in furnishing the many manufacturing concerns of the vicinity with paper.

Buchanan Granted Patent

William E. Buchanan, sales manager for the Appleton Wire Works, Appleton, Wis., has been granted a patent at Washington on a seamless method of joining wire cloth. He applied for the patent in May, 1934. The method produces a joint in the cloth by holding the two ends together, guiding a strand to a position between the edges, and unite the edges by a welding process. Patent rights have been assigned to the company.

Obituary

Orren Clyde Robertson

Orren Clyde Robertson, aged 74, the last of the well known Robertson brothers, famed as paper manufacturers in Hinsdale, died recently following several months of failing health. Death was due to Bright's disease, complicated by influenza.

Mr. Robertson attended the schools in Hinsdale, Vermont Academy at Saxtons River, and Powers Institute in Bernardston, Mass. On October 17, 1883, he married Lizzie A. Saben who died September 20, 1932. Mr. Robertson became associated with his father in the manufacture of paper and later was a member of the firm of G. A. Robertson & Co. Mr. Robertson retired in 1919.

He was a member of Golden Rule Lodge of Masons in Hinsdale, Keene Lodge of Elks, Red Men and Odd Fellows. He was also a director of the Vermont People's National bank in Brattleboro, Vt., a member of the Hinsdale board of selectmen for several years and served as representative from Hinsdale to the legislature in 1915 and 1917.

During his first legislative term he was a member of the committee on the Agricultural College and during his second term served as a member of the committee on the Agricultural College and Banks and Banking. He was a trustee of the Hinsdale fire department's relief funds.

Mr. Robertson is survived by two daughters, Violette, wife of Ralph Wood of Hinsdale, and Marion, wife of Louis N. Stearns of Hinsdale; three granddaughters, Elizabeth Stearns, a student in the University of Vermont; Lucille and Marion Lorraine Stearns of Hinsdale.

Herbert A. Long

[FROM OUR REGULAR CORRESPONDENT]

DEXTER, N. Y., May 11, 1937.—Herbert A. Long, vice-president and general manager of the Dexter Sulphite, Pulp and Paper Co., died last week at the Mercy Hospital. He began as a stenographer with the concern in 1895 and rose to the position of vice-president and general manager more than three years ago. He spent the early part of his life in Canada and later took a law course at the University of Illinois. He was elected to the position he held following the death of Dr. James E. Campbell in 1933. He was a trustee of the Watertown Savings Bank and also prominent in fraternal circles.

Rotogravure Problems

There was an excellent attendance at the regular weekly luncheon and meeting of the Eastern Division of the Salesmen's Association of the Paper industry in the Florentine room of the Hotel Lexington, New York, on Monday last.

George Gibson, who came up from Florida, was given a splendid welcome. He was the first president of the association, and is now chairman of the membership committee. In responding to the introduction by Ted Lyman, he expressed his great appreciation of the message of sympathy sent him at the time of the annual meeting, when he did not know from one hour to the next whether his wife would live.

He said that as soon as he got back to Chicago he would start work on the revision of the A to Z Directory. As a result of his investigation of new mills in the South, he advised members against taking too pessimistic a view of the situation. Most of the new production will be in kraft liner board, where an acute shortage exists.

John F. Scheurich, of the Art Color Printing Company, who was the guest speaker, outlined some of the problems of the rotogravure printer. In gravure or intaglio printing, the type or picture is below the surface of the plate, instead of being raised above the surface.

The paper used in the printing process must have a good formation and quick absorption. These are the two most essential qualities. The old stretch test and pop test have gone by the boards. The absorption quality of the paper has been helped by two recent discoveries—a substitute for clay filler and a sizing that is soluble in the chemicals in the ink.

Improvements in the printing process now makes it possible to get as good results with an English finish sheet as with a supercalendered sheet a few years ago.

When a gravure job does not turn out well he thinks the paper is at fault, Mr. Scheurich said, he tried a different sheet and compared the results. He illustrated his remarks by showing various samples of gravure printing on different grades of paper.

Paper Association Elects

Annual meetings of the separate Divisions of The Paper Association of New York City, followed by a general meeting of the entire association at dinner, were held at the club rooms of the Building Trades Club on Tuesday, May 4. All meetings were very well attended. The following officers were elected for the current year:

President, L. E. Sayre, of Canfield Paper Company.

Treasurer, Morris Schlosser, of Schlosser Paper Corporation.

Secretary, Irwin Slote.

Vice-president, Fine Paper Division, David J. Werner, of Henry Lindenmeyr & Sons; members of the Executive Committee to fill expiring terms: Robert Schmidt, of Miller & Wright Paper Company; and J. H. Gilbert, of The Whitaker Paper Company.

Continuing members of the Executive Committee whose terms have not yet expired: Frank M. Van Horne, of John F. Sarle Company; E. G. Lloyd, of Bulkley, Dunton & Co.; H. Price, of A. Price & Son, and S. C. Garner, of J. E. Linde Paper Company.

Vice-president, Wrapping Paper Division, Gustave C. Indruk, of Tappen & Indruk Co.; members of the Executive Committee to fill expiring terms: James F. Levens, of Geo. W. Millar & Co., and R. C. Kettles, Jr., of Chas. F. Hubbs & Co.

Continuing members of the Executive Committee, whose terms have not yet expired: George W. T. Skinner, of Skinner & Co., Inc.; Elwin Walker, of Walker, Goulard, Plehn Company, Jacob Sincoff, of Jacob Sincoff, Inc.; Max Weill, of The Mutual Paper Company.

Members representing the Paper Association of New York City on the Board of Directors of the National Paper Trade Association, Fine Paper Division: L. E. Sayre; alternate Robert Schmidt; Wrapping Paper Division, R. C. Kettles, Jr., alternate George W. T. Skinner.

Government Paper Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 12, 1937—The Government Printing Office has received the following bids for 46,000 pounds (200,000 sheets) of 38 x 48" offset book paper: Stanford Paper Company, Inc., 6.55 cents per pound; John F. Post, Inc., 6.79 cents; Reese & Reese, Inc., 6.54 and 6.69 cents; Whitaker Paper Company, 6.4 cents; R. P. Andrews Paper Company, 6.55 cents; Mathers-Lamm Paper Company, 6.55 cents; Barton, Duer & Koch Paper Company, 6.54 cents; Old Dominion Paper Company, 6.499 cents; J. R. Howarth Paper Company, 6.9 cents.

For 40,000 pounds of newsprint paper in 24" rolls: Whitaker Paper Company, 3.7 cents; National Pulp and Paper Company, 2.3 cents.

For 76,840 pounds (340,000 sheets) of 50% rag white index: R. P. Andrews Paper Company, at 13.82 cents per pound; Old Dominion Paper Company, 13.597 cents; Barton, Duer & Koch Paper Company, 13.97 cents; Mathers-Lamm Paper Company, 13.7 cents; Marquette Paper Company, 14.75 cents; and Aetna Paper Company, 14.93 cents.

Bids were opened last week by the Treasury for an estimated 1,016 tons of distinctive paper for currency and security issues of the government for the coming year.

Crane & Co. holds the present contract at 37 cents per pound.

The bids included for the paper 75% linen and 25% cotton; at 41 cents per pound from Crane & Co. for the whole amount, all less 400 tons, all less 200 tons and all less 100 tons at 41 cents.

The only other bid received was from the Collins Manufacturing Company for 200 tons at 44¼ cents and for 100 tons at 44½ cents.

Awards have not yet been made.

The following paper awards have been announced:

The Paper Corporation of the U. S. has been awarded the contract for furnishing 350,000 pounds of supercalendered book paper in 38" rolls at 5.74 cents per pound.

J. R. Howarth Company will furnish 1,000 pounds (31,000 sheets) of 24 x 38" white paraffin paper at 9.9 cents. The Whitaker Paper Company will furnish 40,000 pounds (26,400 sheets) of 34 x 44" chip board at 2.16 cents and the Cauthorne Paper Company will furnish 1,000 pounds of white stereotype molding paper in 24" rolls at 11 cents. Bids for all of these items were received on April 28.

The Old Dominion Paper Company will furnish 76,840 pounds (340,000 sheets) of 50% rag single ply white index at 13.597 cents, bids for which were received on April 30 and Reese & Reese will furnish 5,000 pounds of rope manila paper at 1.825 cents per pound, bids for which were received on April 21.

Boston Paper Demand Active

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., May 10, 1937.—Judging from reports in this market, the volume of orders for paper here during the week averaged at least fair. Individual statements from jobbers varied considerably, including in the fine paper division "slowed down;" "pretty fair;" "fairly good, but compared to recent weeks a decided falling off;" "pretty good this week, seems to be a little more activity from all directions," and "good." Comments from wrapping paper wholesalers included "rather dull," "none too brisk," and "good all the week." The box board market was fair, "rather coasting along." It is expected that box board business will be rather quiet until July.

The paper stock market as a whole was fair, being very dull in some lines, but active in a number of others. In price changes, the general tendency was downward. Under old papers, for which there was a rather fair market, mixed papers as a whole, still continued to be quoted at .60 @ .65, f.o.b, Boston, although old newspapers declined to .60 @ .65 from .65 @ .70, f.o.b., Boston, with a smaller demand. There was a good demand for new manila cuttings, which remained steady. Corrugated boxes were in good call, although the price declined to .80 @ .85 from .85 @ .95 and similarly for kraft corrugated boxes, with the price going down to 1.60 @ 1.65 from 1.80 @ 1.85, both f.o.b., Boston. No. 1 kraft declined to 1.90 @ 2.00 from 2.00 f.o.b., Boston.

Under the bagging classification which showed a receding tendency, foreign manila rope was marked down to 4.75 @ 5.00 from 5.00 @ 5.25, f.o.b., Boston. Foreign gunny bagging remained high, even advancing to 2.50 @ 2.60 from 2.35 @ 2.50, f.o.b., Boston, but was rather inactive, while domestic gunny quiet, declined a few points on the high side, being quoted at 2.10 @ 2.15 compared with a former range of 2.10 @ 2.20, f.o.b., Boston. Australian wool pouches were slower, with the value becoming less, the quotation ranging from 3.25 @ 3.30, against a former price of 3.37½, f.o.b., Boston. Foreign scrap burlap declined to 2.15 @ 2.25 from 2.25 @ 2.35, domestic scrap burlap to 1.85 @ 2.10 from 2.10 @ 2.20, and heavy baling bagging to 2.40 @ 2.60 from 2.40 @ 2.75, all f.o.b., Boston. New domestic rags were fairly strong, with a rather good demand. Khakis were particularly wanted.

In old domestic rags, No. 1 grade of roofing stock declined to 1.55 @ 1.65 from 1.60 @ 1.70 and No. 2 to 1.45 @ 1.50 from 1.50 @ 1.55, f.o.b., Boston. Foreign rags continued too high for any appreciable amount of business here. Dark cottons which have been arriving at this port were undoubtedly bought by a number of mills two or three months ago. The price of dark cottons locally was 1.90 @ 2.00, compared with a previous quotation of 2.00 @ 2.10, f.o.b., Boston.

Rex Belt Conveyors

The Chain Belt Company, of Milwaukee, Wis., has just issued a catalog of belt conveyor equipment and engineering data which has been developed for the convenience of the belt conveyor user and the designing engineer. It contains complete and specialized information on the design and application of belt conveyors for the handling of all bulk materials, together with full listing and description of all belt conveyor equipment.

There is also included design information and specifications for completely standardized Rex Belt Conveyors. Charts and tables are provided for quick and convenient selection of the proper unit for any particular requirement, together with dimension drawings of all units to enable engineers to incorporate such units in their material handling plant design.

Indiana Paper Business Excellent

INDIANAPOLIS, Ind., May 10, 1937.—Paper demand in this territory continues to show some improvement, with fine papers and containers seemingly leading in the improvement. Books, covers, bonds and ledgers all apparently are due for a good summer season with prices firm and little indication of any softening.

The container market particularly has seen improvement during the first part of the month. The approach of summer has caused an increase in demand for waxed containers for the ice cream trade. Cheese manufacturers also are actively in the market now for containers and the outlook from this industry for the summer is particularly bright.

Summer specialties have begun to move in a somewhat restricted fashion. Cool weather during the last two weeks has held back the demand, but some buying is being done, mostly for napkins, plates and cups.

Newsprint continues to move readily. Lineage is above the same period last year, taking the state as a whole, and jobbers are expecting a better summer than last year. Prices are firm and indications point to advances due to reported shortages in Canada. The papers in the purely agricultural sections seems due to more prosperity than has been the rule for some years. Page increases were the rule last year among the papers in industrial sections, but rural papers were slow to recover their lost business.

Bags and coarse papers are moving steadily with prices firm. Tissues also are having a good call with slight increases reported in some quarters.

Paper stock men report more mill demand and paying prices have been upped a little. The better class rags and papers are most in demand, but all lower grades are moving.

Ground Wood Group To Meet

Sidney D. Wells, who will be chairman of the Ground Wood Pulp Meeting at the eighteenth Annual Convention of the American Pulp and Paper Mill Superintendents Association, June 23, 24 and 25, Industrial Arts Building, Springfield, Mass., has announced that two of his speakers will be C. D. DeMeres, of Taylor Instrument Companies and R. I. Wynne Roberts of the Norton Company. Mr. DeMeres will present a paper on "Paper and Pulp Grinder Temperature Control." Mr. Wynne Roberts will discuss recent work in the application of Artificial Pulp Stones to the Grinding of Wood Pulp.

Mr. Wells also expects to have the meeting addressed by two or more ground wood pulp superintendents who will present problems from the operating side.

Virginia Beach Convention

A wealth of outdoor sports provides the outstanding attraction of Virginia Beach, where the Southeastern Paper Trade Association will meet in convention June 11 and 12, and Robert Johnston, secretary-treasurer, Old Dominion Paper Company, and chairman of the local arrangements committee, advises that the entertainment as arranged by a special committee will be such that it will be remembered a long, long time.

A New Stock Pump

A complete line of new vertical paper stock pumps is now being offered by the Economy Pumping Machinery Company in the "Sentry" type of pumping unit.

A few of the advantages of the new design are:

1. Ability to work to a lower level in the stock chests.
2. Freedom from air binding.
3. Accessibility—Complete rotor and drive removable without breaking pipe connections.
4. Motor is high above the floor—safe from muck and slop—no danger of flooding.

Economy's new "Sentry" type paper stock pump.

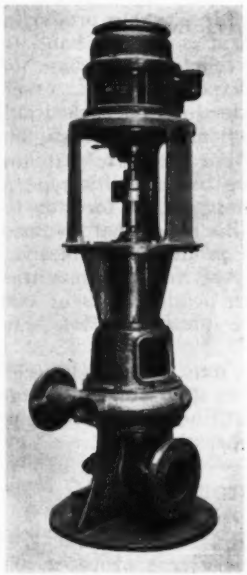


Fig. A

"Sentry" pump showing rotor lifted clear of casing.

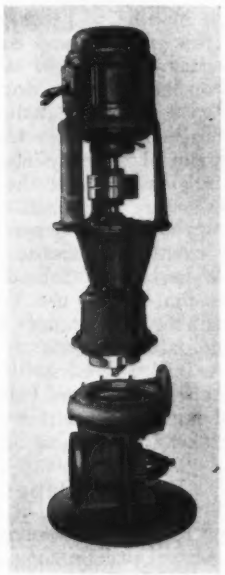


Fig. B

5. Small floor space—A 600 gallon pump fits in a 24x24 inch space.
6. A highly improved stock runner of the wide semi-open type with twisted vanes for handling heavy stock.
7. Heavy mechanical construction—oversize shaft in vertical design does away with destructive shaft delection and resulting bearing loads.
8. Quick acting cleanout in pump suction.

Announcement of this line has been delayed until the pumps have been thoroughly tested in actual installations. The original installations have been under observation for five years, so that the design has thoroughly proved its merits. Units from 3 inches to 10 inches are available. Capacities range up to 2000 G.P.M., depending upon stock consistencies.

The vertical units described above are in addition to Economy's line of horizontal stock pumps which are made in both angularly split and solid shell types.

In the new handbook "Pump Data" 1937, many of the problems of pumping, both general and the handling of paper stock have been described in detail with much information heretofore not within the covers of one book. In addition price and construction details of equipment built by the Economy Pumping Machinery Company, 3431 48 Place, Chicago, are shown. Copies of this handbook are available upon request.

B. C. to Make Bleached Pulp

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., May 7, 1937—The pulp and paper industry of British Columbia will shortly enter into an entirely new phase of production, when bleached pulp as the base for rayon manufacture is produced on a commercial scale.

Experimental production is now under way at the Port Alice plant of the British Columbia Pulp and Paper Company, and rayon pulp production will be commenced in September at the Wood Fibre plant of the company, it is announced. The company has not as yet commenced commercial production of rayon pulp, however, according to officials.

Both plants of the company have undergone extensive addition and improvement work during recent months in preparation for ultimate production of this product, and equipment is now on hand for the manufacture of alpha cellulose, the base for rayon manufacture, for the export trade.

Up to the present the production of bleached pulp in British Columbia has been practically negligible. Provincial forestry officials are therefore watching with great interest the swing towards this type of production, and E. C. Manning, chief forester for the province, has expressed his belief that an opening exists for increase in the production of bleached pulp in British Columbia. Any form of manufacture that would use Western hemlock was of considerable importance to the province, Mr. Manning stated.

A trial shipment of fifty tons of a high grade bleached pulp went forward to the Orient last year, and it is expected that this will be followed up during the present year by further shipments.

Record Paper Output In B. C.

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., May 7, 1937—The year 1936 saw record production of every type of paper and paper product in the province of British Columbia, according to figures recently issued. The report shows that since 1917, when first records were made, there has been a continuous annual increase in production of newsprint. In 1917 the total production was 75,833 tons. The ten-year average from 1927 to 1936 was 233,130 tons of newsprint and 23,640 tons of other papers.

In 1935, British Columbia plants produced 262,123 tons of newspapers. The 1936 figures show a production of 276,710 tons, the highest figure in the province's history. A total of 41,443 tons of other paper products was produced in the province during the year under review, another high record, while a new mark was set in pulp exportation, with a total of 89,000 tons. The 1935 figure was 75,200 tons.

Moisture-Proof Tissue Patent

The patent rights to a moisture-proof tissue, transparent and flexible, just issued by the United States Patent Office to William H. Church, Buffalo, N. Y., and A. Hershberger, Kenmore, N. Y., have been assigned to E. I. duPont de Nemours & Co., Inc., Wilmington, Del. The duPont company also has secured the patent rights to another method of manufacturing moisture-proof materials, for which patent recently has been issued to John H. Collins, Buffalo, N. Y., and to cellulosic articles, as well as artificial silk with subdued luster, both patented by Emil Kline, Buffalo.

W. J. Lawrence Leaves Hercules

William J. Lawrence, a director and a vice president of Hercules Powder Company, and general manager of its Paper Makers Chemical Division, has resigned from the organization, effective May 5, to devote his entire time to the many businesses in which he is interested in the Middle West and the South. This action concludes a service of twenty-six years in the manufacture and sale of paper making chemicals. During that period the use of PMC products became worldwide, not only in the paper business but in many of the other industries served by PMC.

Mr. Lawrence was born in Nova Scotia in 1891. Following his graduation from Shelburne Academy, he entered the textile and paper chemical business. In 1911 he became an executive of the Paper Makers Chemical Company, of Easton, Pa., and later, upon the organization of a number of companies into the Paper Makers Chemical Corporation, he was named president and general manager. When that company became affiliated with Hercules Powder Company in 1931, Mr. Lawrence continued as president and was elected a director of Hercules. Upon consolidation of Paper Makers Chemical Corporation with Hercules Powder Company in 1936, he became a vice president and general manager of the new Paper Makers Chemical Division.

The management of the Paper Makers Chemical Division of Hercules Powder Company has been placed with P. B. Stull, a Hercules director, and formerly general manager of the company's Virginia Cellulose Department. The activities and organization of the Paper Makers Chemical Division will continue unchanged.

Gypsum Orders S & W Machinery

Smith & Winchester Manufacturing Company, South Windham, Conn., announces that it has just installed and started into operation bag making machinery at the U. S. Gypsum Company's Oakmont plant.

Listed among the equipment is a ⅛ barrel combination bottomer; a ½ barrel heavy duty combination bottomer special; a heavy duty tuber with S & W full automatic compensating device and side register control, and several other special presser conveyors.

Paper Makers Golf Tourney

Grover Keeth, Marathon Paper Mills Company, Rothschild, Wis., has announced that the Second Annual Golf Tournament of the Ancient Order of Paper Makers will be held Saturday, August 7. As many of the members have expressed the desire to go back to Trout Lake Golf Course where the tournament was held last year, arrangements are being made to this end.

F. A. O'Neill Jr. Married

F. A. O'Neill, Jr., executive of The Paper Manufacturers Company, Inc., Philadelphia, was married on Saturday, April 24, to Miss Helen Buck of Rydal, Pa. After a reception at the home of the bride's parents, Mr. and Mrs. O'Neill left on an extended trip to California and Honolulu. They expect to return about June 1.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, of Pulp and Paper Mills

Mersey May Build New Machine

MONTREAL, Que., May 9, 1937.—Further particulars in regard to the proposed expansion of the newsprint mill of the Mersey Paper Company, at Liverpool, N. S., are contained in a despatch from Halifax. Negotiations have been under way with the Nova Scotia government for the past six months, according to the Hon. A. S. MacMillan, chairman of the Nova Scotia Power Commission. It centers around the question of developing more hydro-electric power for the operation of a larger mill.

Three propositions have been put to the government by the Mersey Paper Company. One calls for a development costing about $750,000. Another meant the outlay of $1,250,000, and the third, the full development for the expenditure of $2,500,000 to $2,750,000.

"Personally I am in favor of the total development," the Minister explained, when questioned. He added that only the full development of hydro-power, involving the larger amount above-mentioned, would call for the installation of a new newsprint machine, the other plans merely providing for further utilization of existing facilities.

F. C. Huyck Starts Expansion

RENSSELAER, N. Y., May 11, 1937.—An expansion program involving a $300,000 building and remodeling program was started this week by F. C. Huyck & Sons. A new dye house is being built on the northeast corner of the grounds at an estimated cost of $150,000 to replace the one located in the middle of the group. It will be a single fireproof structure with all modern appliances. No new machinery is to be installed. Other structures to be remodeled and modernized are the buildings known as 5, 6 and 10. These are used mainly for storing wool fabrics. An official said the company needs space for convenience but no more persons are to be employed. The program of expansion will be completed early in the fall.

Orr Felt Using New Building

The Orr Felt and Blanket Company, Piqua, Ohio, is now using its new steel and concrete warehouse for storage of raw wool and finished products.

The warehouse contains 65,000 square feet of floor space, and the releasing of this amount of space in the main buildings has made room for the installation of additional machinery to take care of Orr's steadily increasing volume of business.

Construction News

Trenton, N. J.—The Panolyte Corporation, North Enterprise avenue, manufacturer of insulating board and kindred paper board products, will proceed with superstructure for new addition to plant, to be one and two-story, 50 x 350 feet. General erection contract has been let to Newton A. K. Bugbee & Company, Inc., 206 East Hanover street, Trenton. Cost over $70,000, with equipment. Company is a subsidiary of the St. Regis Paper Company, 230 Park avenue, New York, N. Y.

Kalamazoo, Mich.—The Kalamazoo Paper Company, manufacturer of book and writing paper stocks, has approved plans for new addition to mill, to be one-story, reported to cost over $40,000, including equipment. General contract for erection has been awarded to the Miler-Davis Company, Kalamazoo, and work is scheduled to begin at early date.

Wellsburg, W. Va.—The Hammond Bag & Paper Company, Wellsburg, manufacturer of paper bags, sacks and allied paper containers, has taken an option to acquire the local mill of the George & Sherrard Paper Company, a subsidiary of the International Paper & Power Company, 220 East Forty-second street, New York, N. Y., idle for some time past and previously given over to the production of bag paper products of various kinds. New owner proposes to make improvements in the mill and will use for expansion in manufacture.

Chelsea, Mass.—The Standard Box Company, 28 Gerrish avenue, manufacturer of folding paper boxes and containers, has awarded general contract to M. Slotnik, 333 Washington street, Boston, Mass., for interior alterations and improvements in plant, and work will be placed under way at once. It is estimated to cost close to $20,000.

Natural Dam, N. Y.—The Rushmore Paper Mills, Inc., manufacturer of tissue and light-weight paper specialities, is considering early rebuilding of portion of mill, recently destroyed by fire with loss reported over $200,000, including equipment and stock.

Kansas City, Mo.—The Crook Paper Box Company, 906 East Nineteenth street, manufacturer of paper boxes and containers, folding paper boxes, etc., is making miscellaneous awards for electrical equipment and other operating facilities in new one-story and basement plant, 200 x 275 feet, now in course of construction on Tenth avenue, near Burlington avenue, North Kansas City, previously referred to

in these columns. It is proposed to have the structure ready for occupancy in near future, when equipment will be installed for large capacity. Building will be owned by the North Kansas City Development Company, Railway Exchange Building, Kansas City and occupied by Crook Company under long-term lease. The Morris Hoffman Construction Company, Victor Building, Kansas City, is general contractor. New unit will cost close to $110,000, including equipment. Edwin H. Crook is president.

Chester, Pa.—The Scott Paper Company, foot of Market street, manufacturer of tissue papers, has plans under way for new addition to mill, to be used for increased capacity. No estimate of cost has been announced. It is understood that bids will be asked on general contract at early date. The Stone & Webster Engineering Corporation, 49 Federal street, Boston, Mass., is architect and engineer.

Modena, Pa.—The Modena Paper Company, organized to take over and operate local mill property, has plans under way for expansion and improvements in plant, including building modernization and installation of equipment. No estimate of cost has been announced. Frederick L. Smith, 21 East Fortieth street, New York, N. Y., is architect and engineer.

Van Wert, Ohio—The Container Company, South Glenn street, manufacturer of fiber boxes and containers, has awarded general contract to Baker & Schindler, Defiance, Ohio, for proposed new addition to plant, recently referred to in these columns, and will proceed with superstructure at once. New unit will be one and two-story, 60 x 500 feet, and will be equipped primarily for production of special fiber containers for food products, chemicals, etc. It will cost over $200,000, with machinery. P. T. Sherman, Defiance, Ohio, is architect. H. A. Eggerss is president.

Atlanta, Ga.—The Sloan Paper Company, 543-45 Whitehall street, S. W., paper products, has concluded arrangements for purchase of a tract of land on Fair street, to be used as a site for new building, for storage, distribution and general operating service. Plans for structure will be drawn at early date. It is reported to cost close to $75,000, with equipment. James L. Wells is president.

Buffalo, N. Y.—The National Gypsum Company, 190 Delaware avenue, manufacturer of wallboard and kindred products, has arranged for a new preferred stock issue of 80,000 shares and a common stock issue of undetermined number of shares, for general financing, a portion of proceeds to be used for expansion in plants and business, including purchase of equipment for different mills. Company has begun work on additions to mill at Fort Dodge, Iowa, including new unit for wallboard production, to be equipped for a capacity of about 75,000,000 square feet per annum. It is estimated to cost close to $500,000, with machinery. Two other additions will be made at this mill, to represent a further investment of about $400,000 in buildings and equipment.

Bellingham, Wash.—The Puget Sound Pulp & Timber Company has awarded general contract to Howard S. Wright & Company, 2210 Second street, Seattle, Wash., for initial unit of proposed new additions to local sulphite pulp mill at Army and Laurel streets, recently referred to in these columns. New structure will be one-story, about 300 feet long, and will be used for expansion in the machine department. It is reported to cost over $250,000, including equipment, which will provide for large increase in present capacity. Work on superstructure is scheduled to begin at once. Other mill units will follow in near future.

Menasha, Wis.—The Marathon Paper Mills Company, Menasha Products Company Division, manufacturer of waxed paper stocks, etc., has awarded general contract to the James Leck Company, 513 Third avenue, N. E., Minneapolis, Minn., for proposed new addition to local mill, recently noted in these columns, and will proceed with superstructure at early date. It will be two-story and basement, 60 x 250 feet, and will be equipped for expansion in waxing and processing division. New unit will represent an investment of about $125,000, including machinery. An award for structural steel framing for unit has been let to the C. Hennecke Company, 3225 North Pierce street, Milwaukee, Wis. D. C. Everst is vice-president and general manager. New structure will be completed early in August.

Vancouver, B. C.—The Powell River Company, Ltd., Standard Bank Building, has begun an expansion and improvement program at mill at Powell River, B. C., and will install considerable new machinery for the production of dry, unbleached sulphite pulp, with output to be used primarily for export account. The equipment installation will provide for a capacity of about 30,000 tons per annum, but will be operated at approximately one-half that output basis for the first few months on completion. Entire project will cost about $400,000, with machinery.

Edmundston, N. B.—The Fraser Companies, Ltd., Edmundston, has plans under way for new sulphite pulp mill unit at Sinclairs Crossing, N. B., comprising several one and multi-story buildings, estimated to cost over $500,000, including equipment. It is expected to begin work on project in near future.

New Companies

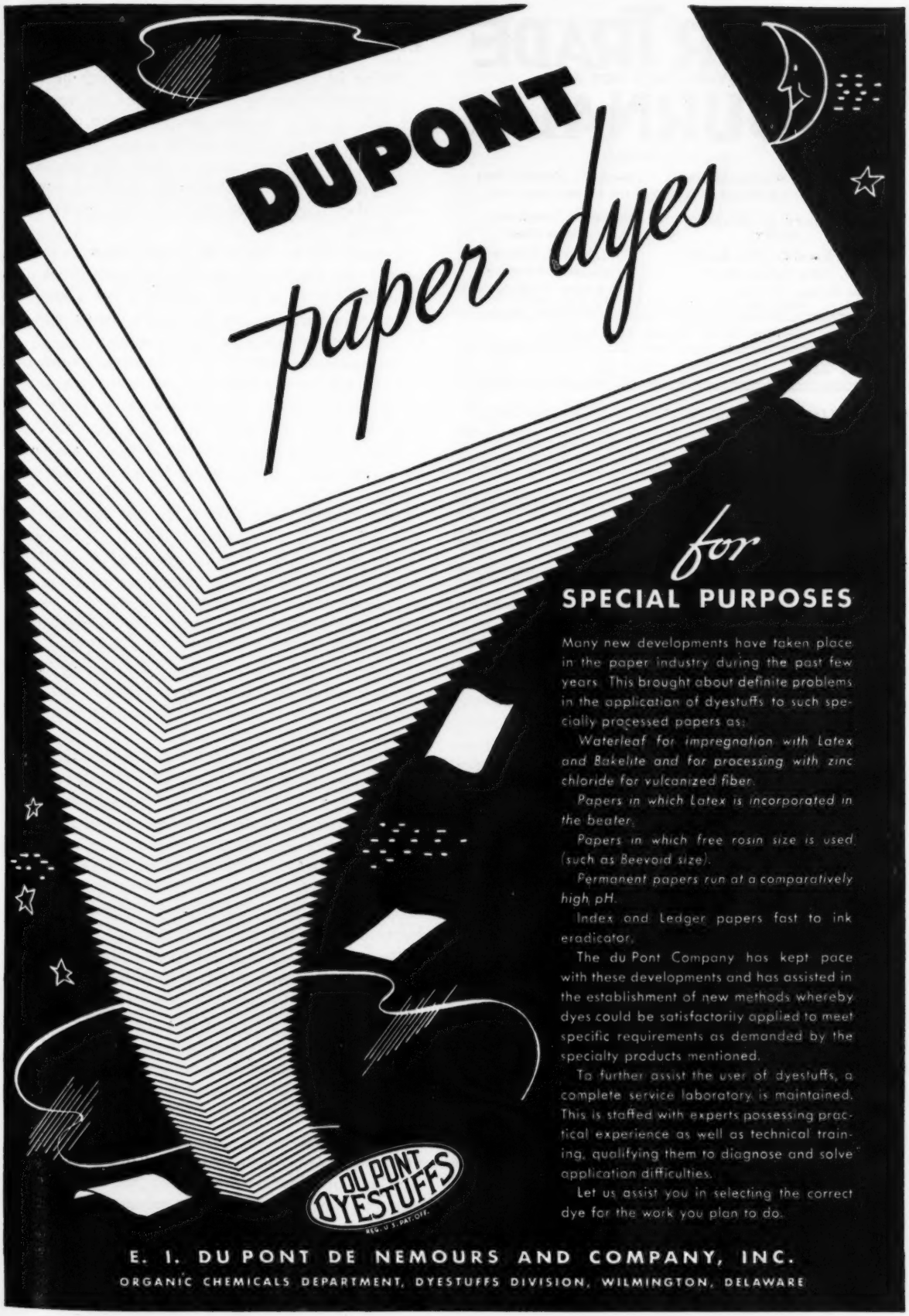
Malden, Mass.—The Famous Novelty Box Company, Inc., 8 Railroad avenue, has been chartered with capital of $10,000, to manufacture paper boxes and containers of various kinds, including hat boxes. Morris Levine is president and treasurer.

Boston, Mass.—The National Paper Products Company, 53 Hanover street, has filed notice of organization to deal in paper products of various kinds. New company is headed by Joseph B. Smith.

Passaic, N. J.—The Julius Levine Paper Company, Inc., has been incorporated with capital of 100 shares of stock, no par value, to deal in paper products of various kinds. New company is represented by Aaron Heller, 66 Lexington avenue, Passaic, attorney.

Malden, Mass.—The Malden Envelope Company has filed notice of organization to manufacture and deal in commercial envelopes and kindred paper products. John V. Meshna, Sr., 580 Lynn street, Malden, heads the company.

Newton Upper Falls, Mass.—The Paper Mill Products Corporation, 156 Oak street, has been chartered with capital of 500 shares of stock, no par value, to deal in waste paper goods. Benjamin Spinoza is president, and D. D. Pine, treasurer.


DUPONT
paper dyes
for
SPECIAL PURPOSES
Many new developments have taken place in the paper industry during the past few years. This brought about definite problems in the application of dyestuffs to such specially processed papers as:
Waterleaf for impregnation with Latex and Bakelite and for processing with zinc chloride for vulcanized fiber.
Papers in which Latex is incorporated in the beater.
Papers in which free rosin size is used (such as Beevoid size).
Permanent papers run at a comparatively high pH.
Index and Ledger papers fast to ink eradicator.
The du Pont Company has kept pace with these developments and has assisted in the establishment of new methods whereby dyes could be satisfactorily applied to meet specific requirements as demanded by the specialty products mentioned.
To further assist the user of dyestuffs, a complete service laboratory is maintained. This is staffed with experts possessing practical experience as well as technical training, qualifying them to diagnose and solve application difficulties.
Let us assist you in selecting the correct dye for the work you plan to do.
DU PONT DYESTUFFS
REG. U.S. PAT. OFF.
E. I. DU PONT DE NEMOURS AND COMPANY, INC.
ORGANIC CHEMICALS DEPARTMENT, DYESTUFFS DIVISION, WILMINGTON, DELAWARE

PAPER TRADE JOURNAL

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COMING EVENTS IN THE PAPER INDUSTRY

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY—Fall Convention, DeSoto Hotel, Savannah, Ga., Oct. 18-20, 1937.

NEW ENGLAND SECTION, Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION, Technical Association of the Pulp and Paper Industry—Fourth Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS ASSOCIATION, Annual Meeting, Springfield, Mass., June 23-25.

BUSINESS IDEALS

The responsibilities and aims of business management in the perspective of present-day needs were taken as a text by Sir Edward W. Beatty, chairman and president of the Canadian Pacific Railway, for an address to upward of one thousand business executives who attended the annual banquet of the National Chamber of Commerce of the United States. He said in part:

It is in the English-speaking communities that industry and commerce have reached their greatest development; that science applied to idle natural wealth has accomplished its greatest wonders; and that the spirit of individual ambition for gain has done most to add to the wealth and privileges of all the human race.

It would be idle to deny that we have now come to a point at which this careless and lavish process of multiplication of wealth by industry and commerce faces new problems. It would be idle to assert that all that we have to do is to continue as our fathers did—to build more cities and factories; to bring more land under the plough; to find new markets for our produce, and new sources of natural wealth.

In principle and in practice the redistribution of wealth, while unquestionably it would add to the power of the poorer members of society to purchase the goods and services of others, could only do this by limiting the power of the present owners of wealth to do exactly the same thing.

The wealth of an individual is merely a part of the condition of wealth of the world in which he lives. The answer to poverty is not to reduce the wealth of the rich. It is to increase the production of all the goods and services of the world, so that they may be enjoyed, in far greater measure than they are today, by the millions who live below the levels of comfort which they might enjoy were all men productively employed.

I should like to offer to those who advocate radical reform the further suggestion that the social and economic system in which we live is not a machine but an organism. Human society is a human entity—as truly organic as is a plant or an animal.

The system of society which we have inherited, and with all our faults, have improved, is not ours to dissipate. It is a trust from generation to generation, and with every willingness to permit and encourage attempts to improve it, it is our duty to pass on to those who replace us the liberty for which our fathers fought.

What we must remember is that the application of the profit motive must be intelligent. In a democracy, for example, it can only be exercised successfully, provided it is exercised in accordance with the will and conscience of the mass of the nation.

Long term profit can be gained only by basing it on a sound and lasting service of the needs of the people as a whole. It can only be gained by treating labour not as a commodity, but as a partner of capital. It can only last if the wealth which results from it is treated as a trust, and not as loot.

This is a time for business men to reassert their faith in the system of society of which they are a part. Now, as we tend to emerge from depression, is the moment to proclaim that business directed by the profit motive is the surest road to increase in production and general distribution of the necessities and comforts of life. This is the time to say that capitalism has not failed; that it is still the surest road to increase in wealth for all the people.

For one, I do not fear the future. I do not believe that democracy cannot last; that we must substitute dictatorship, or the rule of a minority, for freedom. I believe that the people of this continent are sound to the core; that they can be trusted to trust those who deserve it; that their intelligence is high enough to permit them to see the underlying truths of the conditions of our times.

The business world cannot defend itself against demagoguery or reform by trickery, or by conspiracy. The hope of survival of capitalism lies, not in repression, but in education. It lies in substantial correction of its own errors and its excesses; in the demonstration of more wisdom and a higher conscience than it has ever shown.

Business men must gain, far more than they have yet done, the confidence of the mass of the people. If they can convince the public that they know where they are going; that they are wise enough to know that the individual cannot gain profit except as the community flourishes; that capital believes in its essential partnership with labour; that private wealth is, in a modern society, a trust and not a personal possession—then I believe in all honesty that the ferment of the time will end in growth and not in destruction.

Int. Envelope Wages Raised

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, May 10, 1937—Right in line with the harmony existing in paper mill and allied concerns between employer and employee, as demonstrated by recent agreements reached in paper mills, was the announcement the past week that employees of the International Envelope Corporation obtained recognition of their union and a weekly wage increase amounting approximately to $1,500.

In the negotiations the workers were represented by Coleman Claherty, of the American Federation of Labor, and John F. McGarvey, business agent of the Dayton local of the union, while the International Envelope Corporation was represented by James J. O'Connell, president and other company officials.

Labor officials pointed out that not a minute of time or a penny in money was lost by the workers, or members of the union. The Dayton union was recognized as the sole bargaining agent for all of the employees of the corporation, which has the Government contract for stamped envelopes and newspaper wrappers, and wage demands were granted, these being retroactive as to March 10.

In addition to the wage increases, which average $3 weekly for each employee, the company also agreed to make special adjustments for workers in the lower brackets, and these adjustments are now being worked out by the company and will be presented to the workers for approval at an early date.

Panama Buys Seal Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 12, 1937—The Panama Government has recently purchased a total of 868,000 sheets of special seal paper (Papel sellado), in four separate orders from an American firm, according to a report from Assistant Trade Commissioner A. R. Randolph at Panama. This is said to be the first order for papel sellado that has been placed in the United States for many years, due to the fact that the English paper has been lower priced. The American-made paper which secured this business was quoted from .50 to .40 cents less per thousand than the price quoted by English firms.

Moves to Empire State Building

For the third time since opening an Eastern sales office thirty years ago in New York, the allied organizations: The Howard Paper Company; The Maxwell Paper Company; The Aetna Paper Company and Dayton Envelope Company, have moved their offices from Lafayette street to the 41st floor of the Empire State Building.

Production Ratio Report

The following statistics are based upon paper production reports to the American Paper and Pulp Association:

COMPARATIVE MONTHLY SUMMARIES

Months	1937	1936	1935	1934
January	90.3% (c)	76.1%	65.8%	.....
February	90.1% (c)	77.9%	70.0%	.....
March	90.5% (c)	76.0%	70.5%	.....
April	92.1% (c)	82.3%	70.0%	.....
May	.....	81.6%	69.4%	.....
June	.....	80.7%	72.3%	.....
July	.....	77.3%	64.9%	.....
August	.....	81.5%	70.9%	.....
September	.....	80.5%	71.9%	58.2%
October	.....	87.6%	75.6%	64.7%
November	.....	88.0%	75.3%	61.7%
December	.....	85.9%	71.2%	59.6%
Year Average	.....	81.3%	70.5%	.....
Year to Date First 17 weeks	90.6% (c)	77.9%	68.9%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1937		CORRESPONDING WEEKS, 1936	
*Apr. 10	92.4% (c)	Apr. 11	82.9%
*Apr. 17	92.9% (c)	Apr. 18	82.0%
*Apr. 24	91.2% (c)	Apr. 25	83.1%
*May 1	92.0% (c)	May 2	83.4%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks			
Ratio Limits	April 10, 1937	April 17, 1937	April 24, 1937	May 1, 1937
0% to 50%	42	36	35	30
51% to 100%	279	279	274	164
Total Mills Reporting	321	315	309	194

* Subject to revision until all reports are received.
(c) Basic capacity data have been adjusted to correspond with ratings reported on January 4, 1937 Machine Improvement Survey.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours," were as follows:

Mos.	1937	1936	1935	1934	Mos.	1937	1936	1935	1934
Jan.	80% (e)	61%	61%	....	July	....	69%	59%	....
Feb.	86% (e)	67%	67%	....	Aug.	....	75%	65%	....
Mar.	87% (e)	68%	67%	....	Sept.	....	76%	69%	62%
Apr.	....	70%	61%	....	Oct.	....	82%	76%	63%
May	....	68%	61%	....	Nov.	....	79%	70%	56%
June	....	68%	65%	....	Dec.	....	74%	60%	52%

Week end. Apr. 3, 1937—85%
Week end. Apr. 10, 1937—87%
Week end. Apr. 17, 1937—88%
Week end. Apr. 24, 1937—89%
Week end. May 1, 1937—87%

(e) Basic figures to include new members of the National Paperboard Association.

W. W. Henderson Joins Kieckhefer

SAVANNAH, Ga., May 1, 1937.—W. W. Henderson, executive at the Savannah plant of the Union Bag and Paper Corporation, has resigned his position with the company to become connected with the Kieckhefer Container Company, of Plymouth, N. C.

Mr. Henderson is to supervise the building of a mill for the Kieckhefer company at Plymouth and will be general manager of the plant when it goes into operation.

Mr. Henderson is one of the most popular of the group of officials who were brought to Savannah by the erection of the paper bag plant and mill. He has taken an active part in employees' activities, holding the position of president of the Union Athletic Association. A succesor to Mr. Henderson has not been named.

New Rogers Bulletin

Samuel C. Rogers & Co., of Buffalo, N. Y., has just issued a new 4-page illustrated price list effective April 20, covering its line of Rogers Automatic Knife and Saw Grinding Machines.

THEY CALL HIM
"The Drummer"
JIM CAMPBELL, hearty Louisiana native, runs the drum shop in Mathieson's new alkali plant at Lake Charles. Jim will tell you that his is one of the big little jobs in Mathieson's plant. For every single drum has got to be just right and production schedules must be met to the minute if users of Mathieson Caustic Soda are to receive the service they have learned to expect.
Nicknamed "the drummer" by his plant friends, Jim Campbell is typical of the men behind Mathieson Chemicals. Proud of their jobs and proud of their company, these men pull together in a way that makes Mathieson one of the most respected names in the American chemical industry.
The MATHIESON ALKALI WORKS (Inc.)
60 East 42nd Street New York, N.Y.
Mathieson Chemicals

Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Chemical Composition of Wood*

By William G. VanBeckum[1] and Geo. J. Ritter[2]

Abstract

A procedure for determining holocellulose has been devised in which extractive-free wood sawdust is alternately treated with chlorine gas and a solution of hot 95 per cent alcohol containing 3 per cent of monoethanolamine. By the procedure the time required for the determination has been reduced from two days to less than 3 hours. No chemicals with offensive odors are employed and a rather sharp color end point is obtained when the last trace of lignin is removed from the holocellulose. The remainder obtained when the holocellulose is subtracted from 100, checks within a few tenths of 1.0 per cent with that of the lignin content obtained by the actual lignin determination.

This is a report of the progress made on a modification of the procedure for the determination of holocellulose.[3] The work is being done by William G. VanBeckum under the supervision of Geo. J. Ritter of the U. S. Forest Products Laboratory.

Previous Work on Procedure

Previous to 1932, approximately one month was required for the isolation of a wood fraction, "skellettsubstanz," which is comparable to holocellulose. The material was isolated by means of chlorine dioxide. During 1932 a method requiring about two days for the isolation of holocellulose was developed at the U. S. Forest Products Laboratory. Although this was a much improved procedure, it still had some features that required changes. First, it consumed too much time for routine analysis. Second, it required the use of pyridine which is undesirable because of its offensive odor and its unsatisfactory color reaction on the holocellulose when coming in contact with air. Third, the procedure had no definite means of indicating when the holocellulose became free of lignin except by actually determining the lignin content of the material.

Work Done Under TAPPI Fellowship

On September 16, 1936, William G. VanBeckum began work on modifying the procedure for determining holocellulose.

The basis for determining holocellulose is to employ a solvent, such as a basic alcoholic solution which will dissolve the lignin chloride formed during the chlorination of wood and which will leave in solid form all of the carbohydrate material. To accomplish this purpose it is necessary to use some base to neutralize any hydrochloric acid formed during the chlorination treatment and also to make the solvent slightly basic so as to increase its solvent action on the lignin chloride.

Several organic liquids in which were dissolved different types of bases were tested for their solvent action on lignin chloride prepared from isolated lignin. Of these the most promising consisted of hot 85 per cent alcohol containing 3 per cent (by volume) of monoethanolamine. This alcohol-monoethanolamine solution dissolves lignin chloride readily and has little if any solvent action on the polysaccharides in the carbohydrate fraction.

A method specifying the use of alcohol-monoethanolamine solution has been developed for the determination of holocellulose. It has been employed on four different woods, some of which have manifested difficulties that required slight changes in the procedure.

It is a simple method, and, as just stated, has been employed on four woods including three of the following: white spruce, jack pine, eastern hemlock, balsam, and aspen, proposed by the TAPPI Committee. In order to test the accuracy of the method it is important to analyze samples from two or more trees of each of the species listed. These analyses will be made during the remaining tenure of the fellowship. A complete report of the study will be made at the September meeting of TAPPI.

Materials Used for Analyses

Wood sawdust (60-80 mash) was extracted with alcohol, alcohol-benzene, and hot water. The extracted material was then air dried to about 6 per cent moisture content.

Alcohol (95 per cent) containing 3 per cent (by volume) of monoethanolamine was employed for extracting the lignin chloride.

Procedure for Determination of Holocellulose

Weigh accurately, in a tared alundum crucible, about 2.0 grams of air-dry extracted wood sawdust (60-80 mash) whose moisture content is known. Moisten the material with cold distilled water (10 deg. C.) and remove excess moisture by suction.

Using moderate suction, chlorinate the sample by passing the gas through a funnel connected with a chlorine cylinder and inverted over the crucible with its contents, which is held in position on a suction flask. After 3 minutes' chlorination remove the inverted funnel, stir the sawdust thoroughly, and rechlorinate 2 minutes.

Add distilled water (10 deg. C.) to dissolve excess chlorine and hydrogen chloride and remove it by suction. Disconnect the suction, add sufficient hot alcohol-monoethanolamine to completely cover the wood, and stir thor-

* Progress report of U.S.F.P.L. Project 7112 carried on in cooperation with the Technical Association of the Pulp and Paper Industry.
[1] Member TAPPI, TAPPI Fellow working at Forest Products Laboratory, Madison, Wis.
[2] Senior Chemist, Forest Products Laboratory, Madison, Wis.
[3] Holocellulose is the total carbohydrate fraction in wood that has been freed of its extraneous materials.

oughly. The hardwoods at this stage become deep red; the softwoods, brown. Allow the wood-solvent mixture to stand 2 minutes; remove the solvent by suction. Repeat the treatment with the solvent and remove by suction. Remove any remaining solvent by repeated washings with water (10 deg. C.) until washings are no longer colored.

Repeat the chlorination and extraction treatments until the residue becomes white following chlorination and is no longer colored by addition of the hot solvent.

Remove the alcohol-monoethanolamine and wash with cold distilled water until the residue is neutral to litmus. Wash with alcohol and finally with ether to facilitate drying. Air dry the holocellulose to remove excess ether and finally dry to constant weight in an oven at 103 deg. C.

Using the foregoing procedure, duplicate holocellulose determinations can be made on extractive-free wood sawdust in approximately 3 hours. The chemicals used emit no offensive odors and a distinct color end point is noted, changing from a light pink or light brown to white on removal of the last trace of lignin as shown by the actual lignin determination.

Several duplicate determinations of holocellulose were made on each of the woods reported herein. The results on each wood checked within a few tenths of 1.0 per cent, showing good precision. The average of the results is recorded in the following table.

TABLE I.—HOLOCELLULOSE AND LIGNIN CONTENT OF EXTRACTIVE-FREE WOOD

(Results based on oven-dry weight of extractive-free wood.)

Wood	Lignin by sulphuric acid method	Holocellulose by tentative method	Lignin and holocellulose
	Per cent	Per cent	Per cent
Aspen	17.5	82.1	99.6
Maple	23.5	76.3	99.8
Jack pine	27.2	72.5	99.7
Eastern hemlock	31.5	68.5	100.0

The result of the analyses indicate that the holocellulose content subtracted from 100, checks closely with the lignin content which is obtained by the actual lignin determination.

The foregoing data are encouraging. We feel enthusiastic about the study and are confident that a good method will be offered for consideration at the September meeting of TAPPI.

From some preliminary results it appears that about 75 per cent of the lignin chloride can be removed by means of a solution of cold water containing a small percentage of monoethanolamine and the remainder removed with the solvent specified in the procedure prescribed in this report. The use of the water will be thoroughly investigated during the remaining period of the fellowship. In the event water is suitable, the cost of chemicals for the determination of holocellulose will be reduced considerably.

Alkali-Staining Property of Paper

It is desirable that certain papers, particularly those used as soap wrappers, should not stain unduly with alkali. In the past this property has been generally judged by dropping upon the paper alkaline solutions of varying strengths. The present method is designed for a quantitative statement of the resistance to alkali staining.

Reagents

1. *Potassium Bichromate Solution.* Dissolve 0.25 gram of $K_2Cr_2O_7$ in a small amount of water and dilute to 1 liter.
2. *Congo-Red Solution.* Make up a 1 per cent solution in water. Eastman Kodak Company Congo Red E. K. 770 is recommended.
3. *Normal Sodium-Hydroxide Solution.*

Apparatus

1. *Nessler Tubes.* A set of six is convenient. They should be made with thin colorless walls 1 mm. thick, have a diameter of 29-30 mm., and the 50-cc. mark should be about 90 mm. from the bottom outside.
2. *Precision Pipette.* Capacity 1 cc., graduated to 0.01 cc.

Test Specimen

The test specimen shall consist of 3 grams of the paper torn into pieces ¼ to ½ inch square. (See Note 1.)

Procedure

Place the test specimen in a 250-cc. Erlenmeyer flask, add 50 cc. of hot water and boil for 5 minutes. Decant off the liquid into a 100-cc. flask or graduated cylinder. Add 50 cc. of hot water to the paper in the flask and boil again for 5 minutes. Decant the second liquid into the first and make up to 100 cc., using the make-up water to wash the paper in the flask.

Add 25 cc. of normal NaOH solution to the combined liquids and, after standing for at least 5 minutes, filter, using a fast filter paper if the insoluble matter is flocky, or a close filter if it appears cloudy. Compare the clear filtrate with standards made as follows:

To 50 cc. of the bichromate solution add 0.1 cc. of the congo-red solution and mix well. Place different amounts of this mixed solution, such as 0.2, 0.5, 1.0, 2.0 cc., each in separate Nessler tubes, dilute to the 50 cc. mark with water and mix.

Place 50 cc. of the filtered alkaline solution from the paper in another Nessler tube and compare with the standards. The solutions are best compared by holding the tube containing them over white paper, but not resting on it, and looking down the inside of the tube. If none of the standards match the solution, make up standards of other strengths and compare them with the solution.

Report

Report the number of cc. of bichromate-congo-red solution required to match the tint of the alkaline extract of the paper as the *alkali-staining number*. Express results to 1 decimal place.

Interpretation of Results

It has been found that papers showing an alkali-staining number of more than 3 will give a marked stain with 1 per cent caustic soda solution by the drop test.

Notes: (1) With vegetable parchment a finer subdivision of the sample is advisable.

(2) Exact matches of tint are not always possible, but distinction in intensity is readily seen.

(3) As bichromate slowly destroys the congo-red color the solution should not be mixed until immediately before use.

Reference

Crossley, T. Linsey,—"A Quantitative Test for Soap Wrap Paper". Tech Assn. Papers, 20 (1937).

New England TAPPI to Meet

The New England Section of the Technical Association of the Pulp and Paper Industry will meet at the Bancroft Hotel, Worcester, Mass., May 21, 1937. C. G. Weber, of the Bureau of Standards, Washington, D. C., will be the principal speaker.

Instrumentation Studies. XIII

Adaptability of the G. E. Reflection Meter as a Color Analyzer

By The Staff of The Institute of Paper Chemistry

PART II

Factors Influencing the Accuracy of Measurements on the General Electric Reflection Meter

In the first section of this part of the report the theory of the measurement of reflectance on both the General Electric Hardy color analyzer and the General Electric reflection meter is discussed[2]. The effects on the measured reflectances which may be expected from each of the factors included in the theoretical expressions for these reflectances are considered in the order of their appearance in the theoretical equations. The theoretical justification for the expectance of good correlation between the reflection meter reflectances for the eight filters and analyzer reflectances corresponding to the "effective wave lengths" of these filters is discussed.

The second section deals with the use of the auxiliary heat filter, which is placed in the light beam between the sample and the photocell. Representative data of Part I of this report is repeated to show the advantage of the use of this filter. Data are presented to emphasize the small differences which arise in the standard brightness measurements upon the addition of the auxiliary filter to the optical system of the instrument. It is shown that the differences in reflectance observed for some samples are due to properties of the samples themselves and not to some peculiarity of the instrument.

The third section treats of the reasons for the necessity of the use of the auxiliary filter for obtaining consistent reflectance values. The hypothesis of an infra-red fluorescence of certain samples is proposed, and is then employed in explaining the observed facts relative to these samples. The possibility of the infra-red fluorescence causing errors in the analyzer reflectances is treated. The suggestion is then made that the monochromatizing filters might be used in the light beam between the source and the sample in order to obviate this difficulty of an infra-red fluorescence.

The fourth section considers quantitatively the differences observed for specific samples with regard to illuminating the samples at 90 degrees with the surface and viewing at 45 degrees, and illuminating at 45 degrees and viewing at 90 degrees.

The fifth section deals with the irradiation of the glass samples as a source of error in comparing results as obtained on the two instruments. This point must be considered whenever results as obtained on two different reflection meters are compared.

[2] These two instruments will hereafter be referred to as the analyzer and the reflection meter.

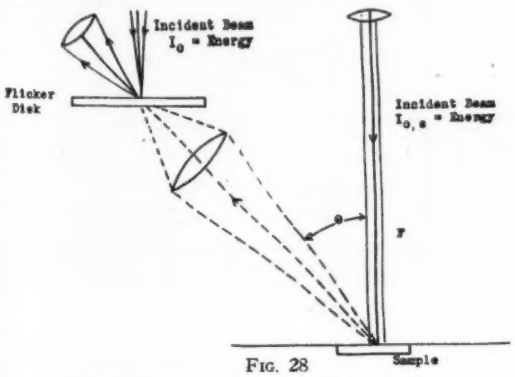


FIG. 28
Schematic Diagram of Hardy Color Analyzer

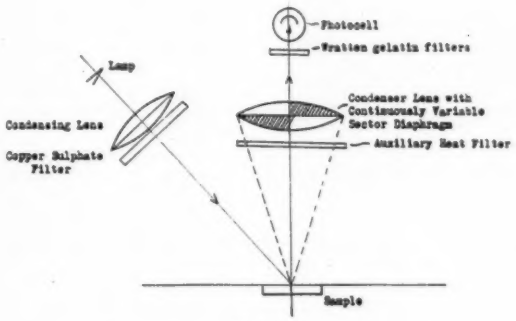


FIG. 29
Schematic Diagram of General Electric Reflection Meter.

THE THEORY OF THE REFLECTANCE MEASUREMENTS ON THE G. E. REFLECTION METER AND THE HARDY COLOR ANALYZER

The theory of the measurements of reflectance on both the analyzer and the reflection meter is presented for the purpose of pointing out those factors in both instruments which contribute to the accuracy and reproducibility of the measurements. An additional objective is to present the factors which are essentially different in the two measurements in such a fashion that an estimate may be made of the order of magnitude of the discrepancies to be expected due to these fundamental differences in the experimental set-up. The general theory is discussed for the sake of completeness. Simplifying assumptions are then made in order that each important factor may be considered separately.

The schematic diagrams (Figs. 28 and 29) give the optical systems of the analyzer and the reflection meter. The symbols whch are used in the final expressions for the reflectance of a sample in terms of the standard white are defined as follows:

Definition of Terms

I_λ	Energy of average wave length λ incident on the flicker disk.
$I_{\theta,\lambda}$	Energy of average wave length λ incident on the sample.
θ	Angle between diffusely reflected light beam and incident beam.
$R_\lambda(\theta, \lambda)$	Reflectance per unit solid angle per unit wave length range of magnesium carbonate at the angle θ with the incident beam. This reflectance depends on wave length as well as on the angle with the incident beam.
$R_s(\theta, \lambda)$	Reflectance of the sample per unit solid angle per unit wave length range at the angle θ.
$R(\bar{\lambda})$	Reflectance of the sample for the finite wave length range λ_1 to λ_2.
$\bar{\lambda}$	Average wave length over the range λ_1 to λ_2.
$S(\lambda)$	Photocurrent output of the photocell per unit energy between wave lengths λ and $\lambda + d\lambda$ which are incident on the photocell.
$T_1(\lambda)$	Percentage transmission of the $CuSO_4$ filter between the wave lengths λ and $\lambda + d\lambda$.
$T_2(\lambda)$	Percentage transmission of the auxiliary heat filter between the wave lengths λ and $\lambda + d\lambda$.
$T_3(\lambda)$	Percentage transmission of the regular reflection meter gelatin filters between the wave lengths λ and $\lambda + d\lambda$.
ϕ_0	Angle of open sector on the reflection meter.
$d\lambda$	Element of wave length difference of two slightly different wave lengths λ and $\lambda + d\lambda$.
$d\omega$	Element of solid angle.
ds_0	Element of surface area of standard.
ds_1	Element of surface area of sample.

For the case of balance or equally reflected light energies from the sample and the standard, the photocurrent caused by the light reflected from the sample is equal

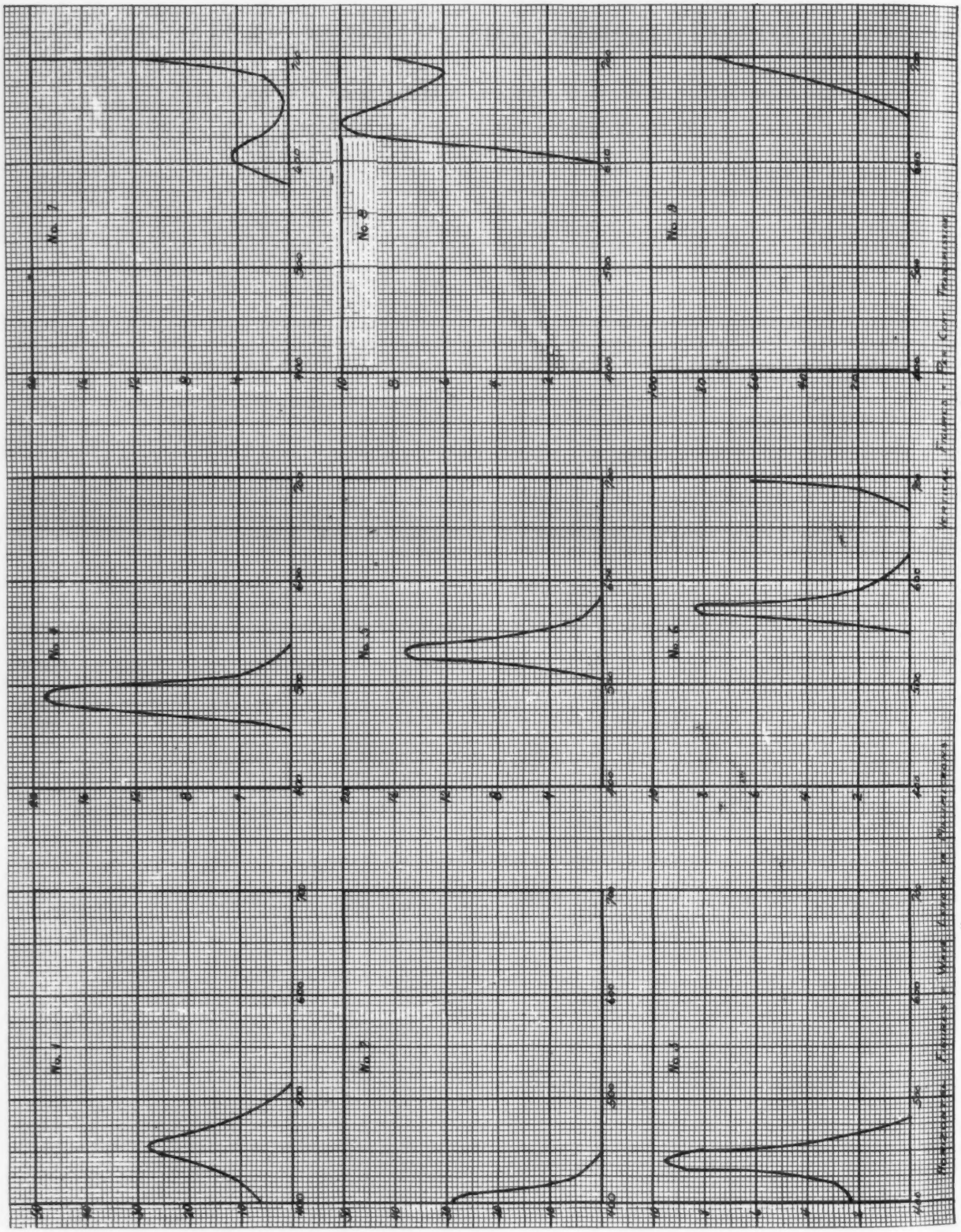

No. 7
No. 8
No. 9
No. 4
No. 5
No. 6
No. 1
No. 2
No. 3
Vertical Fibers Per Cent Transmission
Horizontal Fibers Per Cent Transmission

FIG. 30

to that arising from the flicker disk. It is evident that the photocurrent is proportional to the following factors:

1. The energy of the incident light beam included in the 10 millimicron wide wave length band.
2. The percentage of light reflected by the sheet (or the reflectance of the sheet).
3. The photocurrent output per unit incident energy (or the photocell sensitivity).

Hardy Color Analyzer:

The quantitative expression for the proportionality at the balance condition is given in the following equation:

$$ds_0\int_{\lambda_1}^{\lambda_2}\int_{\theta_1}^{\theta_2} I_0(\lambda) R_0(\theta,\lambda)\, S(\lambda)\, d\lambda dw = ds_s\int_{\lambda_1}^{\lambda_2}\int_{\theta_{1,s}}^{\theta_{2,s}} I_{0,s}(\lambda)\, R_s(\theta,\lambda)\, S(\lambda)\, d\lambda dw.$$

G. E. Reflection Meter:

The expression for the balance becomes:

$$ds_0\int_{\lambda'_1}^{\lambda'_2}\int_{\theta_1}^{\theta_2} I'_0(\lambda)\, R_0(\theta,\lambda)\phi_0 T_1\, T_2\, T_3\, S(\lambda)\, d\lambda dw =$$

$$ds_s\int_{\lambda'_1}^{\lambda'_2}\int_{\theta'_1}^{\theta'_2} I'_0(\lambda)\, R_s(\theta,\lambda)\phi_s T_1\, T_2\, T_3\, S(\lambda)\, d\lambda dw.$$

The expressions may now be rewritten in terms of the measurable aperture openings on both instruments. For the analyzer, the reflectance is given by the ratio of the sector opening for the sample to that for the white standard. The expression for the reflection meter reflectance is again given by the ratio of the aperture openings for the cases of the sample and the standard. These ratios are given in the following two equations:

Hardy Color Analyzer:

$$R(\overline{\lambda})_{HCA} = \frac{ds_s\int_{\lambda_1}^{\lambda_2}\int_{\theta_{1,s}}^{\theta_{2,s}} I_s(\lambda)\, R_s(\theta,\lambda)\, S(\lambda)\, d\lambda dw}{ds_0\int_{\lambda_1}^{\lambda_2}\int_{\theta_1}^{\theta_2} I_0(\lambda)\, R_0(\theta,\lambda)\, S(\lambda) d\lambda dw}$$

G. E. Reflection Meter:

$$R(\lambda)_{GERM} = \frac{ds_s\int_{\lambda_1}^{\lambda_2}\int_{\theta_{1,s}}^{\theta'_{2,s}} I_s(\lambda)\, R_s(\theta,\lambda)\, T_1\, T_2\, T_3\, S(\lambda) d\lambda dw}{ds_0\int_{\lambda_1}^{\lambda_2}\int_{\theta_1}^{\theta_2} I_0(\lambda)\, R_0(\theta,\lambda)\, T_1 T_2 T_3 S(\lambda) d\lambda dw}$$

One is now in a position to see how each factor enters the expression for the measured reflectance. The factors will be discussed in the order of their appearance in the equations.

(1.) The wave length range on the analyzer is 10 millimicrons from the blue to the red end of the spectrum. On the other hand, the wave length range on the reflection meter varies from 50 to 100 millimicrons for the different filters. It is seen that the reflectances on the reflection meter must approximate the average of analyzer reflectances for the given wave length range transmitted by the reflecton meter filter. The percentages of transmission for the reflection meter filters as functions of the wave length are given in Figure 30. The transmittances as given by these curves are averages of data quoted by the Eastman Kodak Company and are reproduced by the General Electric Company.

(2.) The angle between the extreme rays which pass through the condensing lens after reflection is different for the two instruments. These angles are defined by the distance from the sample to the lens and the diameter of the lens. This factor would be unimportant if the paper samples were to behave as does an ideal diffuser, such as $MgCO_3$ or MgO. However, some differences may arise due to this cause, since the papers for the most part are not ideal diffusers. This fact results in a different distribution of intensity over the solid angles subtended by the lenses of the two instruments, thereby giving rise to different average reflectances. The solid angles subtended by the condenser lenses at the position of the center of the sample are:

Hardy Color Analyzer ..... 0.060 steradians
G. E. Reflection Meter ..... 0.546 steradians

In order to estimate experimentally the magnitude of the differences to be expected in the reflectances due to this difference in solid angle, data were taken on the reflection meter for $MgCO_3$, paper, and enamels for three different sized apertures placed over the dust shield. These apertures permitted changing the solid angle subtended by the condenser lens from 0.55 to 0.06 steradians. The data are given in Table I. The results indicate a decrease of apparent reflectance of two per cent in changing the solid angle from 0.55 to 0.06. No generalization may be drawn from this result. However, it does indicate that the analyzer readings might be low for certain papers as compared to reflection meter readings, because of this difference in solid angle.

TABLE I.—VARIATIONS OF REFLECTANCE AS DETERMINED ON THE G. E. REFLECTION METER WITH VARIATION OF THE SOLID ANGLE SUBTENDED BY THE CONDENSING LENS AS OBTAINED ON THE NO. 1 FILTER

Solid Angle in Steradians.....	0.55	0.22	0.06
Sample	Reflectance	Reflectance	Reflectance
$MgCO_3$	100	100	100
Carrara M493	75.7	75.7	74
White Paper	81.5	81.5	79.5
Enamel No. 3E.....	75.0	75.0	72.5
Enamel No. 5E.....	61.5	61.5	59.3

(3.) The values for the light energy at a given average wave length and the same wave length range for the two sources are about the same before being dispersed and filtered. This fact is due to the two tungsten filament lamps being run at approximately the same color temperatures. However, the actual distributions of energy for corresponding average wave lengths on the two instruments are quite different on account of the above mentioned difference in wave length range.

(4.) The apparent reflectance of a sample depends on the angle which the incident beam makes with the reflecting surface, as well as on the angle between the directions of the incident and reflected beams. It is generally stated in the literature that the optical path for the case of illuminating the samples at 90 degrees and viewing at 45 degrees is reciprocal to that for illuminating the sample at 45 degrees and viewing 90 degrees. This reciprocity infers that the same apparent reflectance will be obtained for a diffusely reflecting substance for both of these optical systems. The data to be discussed later indicate that for certain samples the reflectances so determined may differ by as much as 5 per cent. If this factor is as real as it appears to be, some of the small differences between the analyzer and the reflection meter results may be attributed to this cause. More specific details will be given on this point below, since this is a fundamental difference between the two methods of measurement. There is still another point to be mentioned here, namely, that the R values are different functions of the wave length for 45 degree illumination than they are for 90 degree illumination. This means that one cannot get one set of reflectance values from the other by the application of a simple multiplicative constant. The differences between these two cases of illumination should become smaller the nearer the sample surface is to that of an ideal diffuser.

(5.) The question of filters in the beam for the case of the reflection meter does not enter in the case of the analyzer. Consequently, these factors must be

FIG. 30

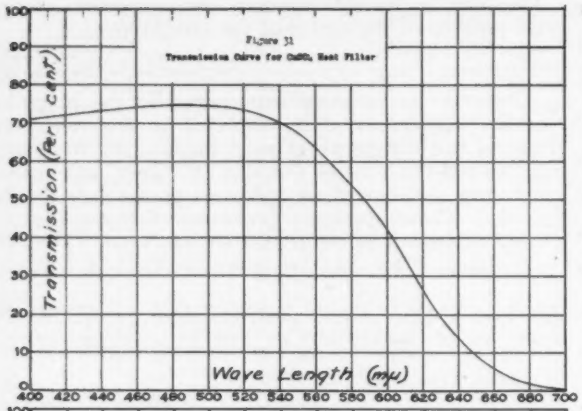


Figure 31
Transmission Curve for CuSO4 Heat Filter
Transmission (Per cent)
Wave Length (mμ)

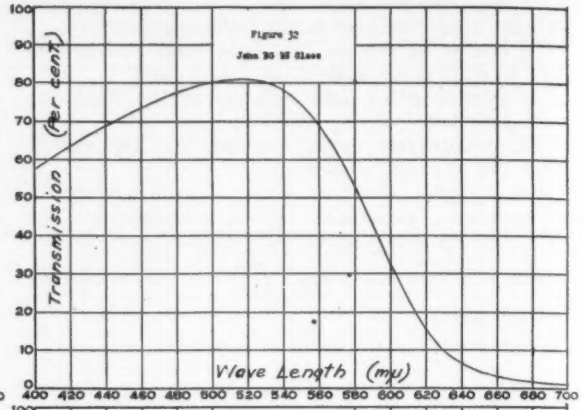


Figure 32
Jena BG 18 Glass
Transmission (Per cent)
Wave Length (mμ)

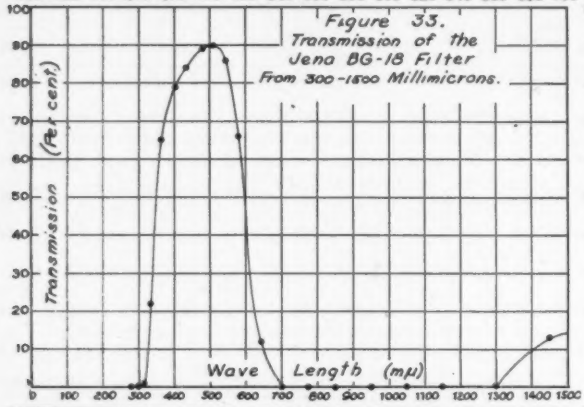


Figure 33.
Transmission of the
Jena BG-18 Filter
From 300-1500 Millimicrons.
Transmission (Per cent)
Wave Length (mμ)

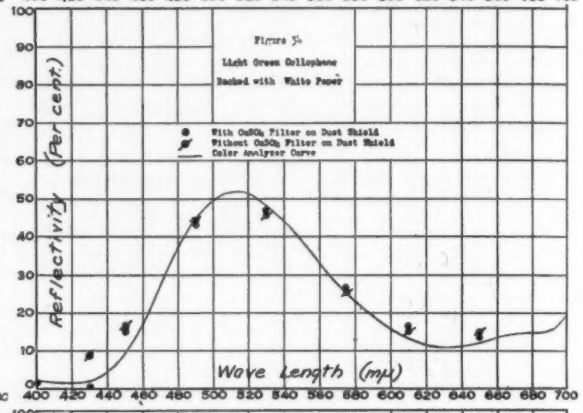


Figure 34
Light Green Cellophane
Backed with White Paper
With CuSO4 Filter on Dust Shield
Without CuSO4 Filter on Dust Shield
Color Analyzer Curve
Reflectivity (Per cent)
Wave Length (mμ)

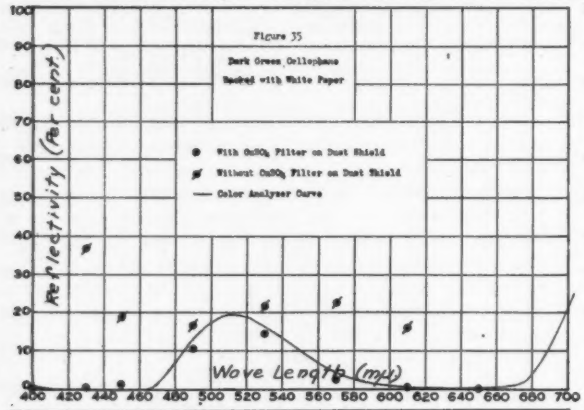


Figure 35
Dark Green Cellophane
Backed with White Paper
With CuSO4 Filter on Dust Shield
Without CuSO4 Filter on Dust Shield
Color Analyzer Curve
Reflectivity (Per cent)
Wave Length (mμ)

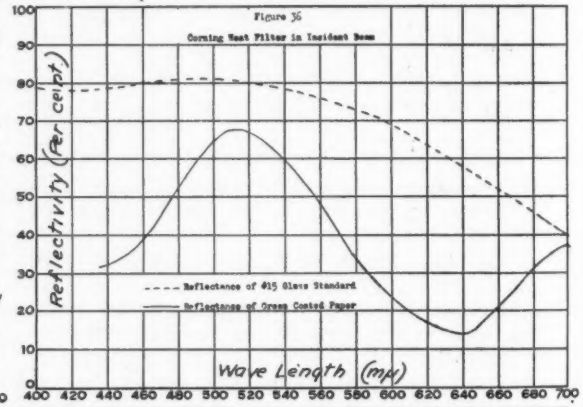


Figure 36
Corning Heat Filter in Incident Beam
Reflectance of #15 Glass Standard
Reflectance of Green Coated Paper
Reflectivity (Per cent)
Wave Length (mμ)

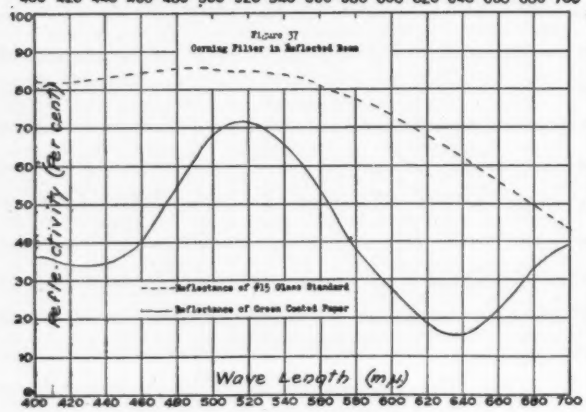


Figure 37
Corning Filter in Reflected Beam
Reflectance of #15 Glass Standard
Reflectance of Green Coated Paper
Reflectivity (Per cent)
Wave Length (mμ)

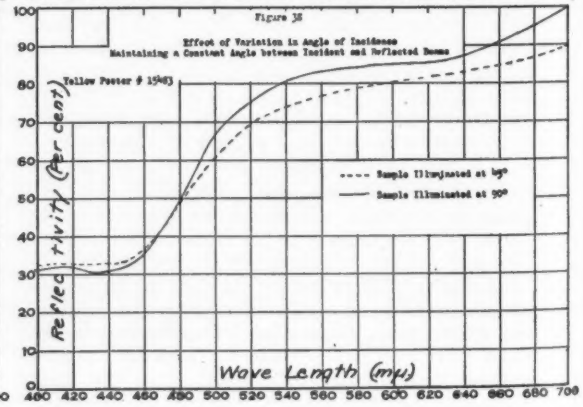


Figure 38
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
Yellow Poster # 15483
Sample Illuminated at 45°
Sample Illuminated at 90°
Reflectivity (Per cent)
Wave Length (mμ)

FIGS. 31-38

considered in detail. The T_1, T_2, T_3 values, plotted as functions of wave length, are to be found in Figs. 30-33.

(a.) The transmission curve for the $CuSO_4$ indicates the purpose of this filter. The major purpose is to absorb a large percentage of the infra-red light emitted by the tungsten lamp. Also, it is to be noted that the filter has a high percentage of transmission in the visible spectrum. A feature to be recalled later is that the transmission in the visible is essentially constant from wave length 400 to wave length 500.

(b.) The transmission of the Jena filter is much lower at the red end of the spectrum than that of the $CuSO_4$ filter. The difference to be noted here is that the transmission is not as uniform over the visible as it is for the $CuSO_4$. The important use of this filter, as was pointed out in the first part of the report, is to absorb the fluorescent infra-red excited in the sample.

(c.) The transmission of the regular reflection meter filters can be seen to show fairly sharp peaks at the average wave lengths as calculated for the most of the filters. These transmissions, to be ideally comparable with the wave length bands as obtained on the analyzer, should be flat-topped curves with an abrupt cut off rather than the smoothly varying curves which actually arise. The quantitative treatment of the effects introduced by the use of these filters will be taken up below.

(6.) The spectral sensitivities of the analyzer and the reflection meter photocells may be quite different. Happily, the spectral sensitivity of the analyzer photocell is not so important. This is due to the fact that the spectral sensitivity is practically constant over the 10 millimicron wave length band of the analyzer. However, it is estimated that differences up to three per cent may be attributed to variation between the spectral sensitivities of the two photocells.

In the foregoing six points the differences arising in the two instruments for the factors included in the theoretical expressions for the measured reflectances have been reviewed. The points will now be discussed in terms of the experimental data bearing on each one. First the question must be answered: How accurately may the average reflectance over the wave length range of a given filter be expected to agree with the reflectance as measured by the analyzer for the average wave length corresponding to that calculated for the reflection meter filter? To answer this question a number of assumptions must be made in order to calculate the theoretical reflection meter reflectance. The assumptions necessary for a simple treatment are:

(1.) $R_o(\theta, \lambda)$, the reflectance as a function of wave length and angle, is the same for the two instruments. This $R_o(\theta, \lambda)$ is assumed to be given correctly by the reflectance curves of the analyzer.

(2.) $S(\lambda)$, the photocell sensitivity of the reflection meter photocell, is constant over the wave length range of each filter used.

(3.) The intensity of the light source is sensibly constant over the wave length range of each filter used.

(4.) The sample and the standard have reflectances obeying Lambert's law within the range of angles found in the analyzer and the reflection meter.

Under these assumptions, the expression for the reflectance as measured on the reflection meter becomes:

$$R_{GERM} = \frac{\int R_s(\lambda)\ T_1\ T_2\ T_3\ d\lambda}{\int R_o(\lambda)\ T_1\ T_2\ T_3\ d\lambda}$$

For the purpose of still further simplification it is assumed that the $CuSO_4$ and the Jena filters have constant transmittances over the wave length range of each filter used. Introducing these assumptions the theoretical reflectance becomes:

$$R_{GERM} = \frac{\int R_s(\lambda) \cdot T_3\ (\lambda)\ d\lambda}{R_o(\lambda) \int T_3\ (\lambda)\ d\lambda}$$

Instead of performing the integrations indicated in the final expression above, a numerical sum is taken. For the computation, a wave-length range of 10 millimicrons is chosen. For the calculation, the analyzer R (reflectance) is multiplied by the T_3 for the wave length, for each 10 millimicron wave length units and the sum of these results is divided by the corresponding sum of the T_3. As a sample of calculation, the results for filter 1 are given for four representative samples. These data appear in Tables IIa and IIb.

TABLE IIa.—SAMPLE CALCULATION OF G. E. REFLECTION METER REFLECTANCE FROM HARDY COLOR ANALYZER REFLECTANCES FOR THE SAMPLES AND THE TRANSMITTANCES OF THE WRATTEN FILTERS ACCORDING TO THE EQUATION

$$\frac{R_s\ (\lambda)\ T_3(\lambda)\ d\lambda}{R_o\ (\lambda)\ T_3(\lambda)\ d\lambda}$$

		Filter No. 1—"Brightness Filter"							
	Transmittance (T_3) of No. 1 filter in %	Orange Coated		Yellow Coated		Green Coated		Carrara Green	
λ		Refl.	RT	Refl.	RT	Refl.	RT	Refl.	RT
405	6.5	8.0	52.0	15.0	97	35	228	49	320
415	8.5	7.6	65.0	14.0	119	34	288	43	370
425	11.5	7.0	80.0	13.5	155	33	380	38	440
435	16.0	7.0	112.0	13.0	207	33	530	35	560
445	22.8	7.0	164.0	13.0	295	33	750	33	750
455	28.0	6.2	174.0	14.0	390	36	970	33	930
465	22.0	6.0	132.0	15.0	330	42	925	34	750
475	14.0	6.0	84.0	17.0	238	49	685	35.5	500
485	7.5	6.0	45.0	20.0	150	57	430	38.0	285
495	3.5	6.0	21.0	24.0	73	64	222	41.5	145
505	.5	7.0	35.0	28.0	14	68	34	45.0	22
	Sum T_3=141.0	Sum RT_3=965.0			2068		5442		5072

G. E. reflection meter reflectance = Sum RT_3/Sum T_3

G. E. reflection meter reflectance (theoretical)	$\frac{965}{141}$ =6.8	$\frac{2068}{141}$=14.7	$\frac{5442}{141}$=38.5	$\frac{5072}{141}$=36.0

TABLE IIb.—COMPARISON OF THEORETICAL AND OBSERVED G. E. REFLECTION METER REFLECTANCE VALUES WITH REFLECTANCES TAKEN FROM HARDY COLOR ANALYZER CURVES AT THE "EFFECTIVE WAVE LENGTH" OF THE FILTERS

Filter No.	Color Analyzer Values at Average Wave Length Passed By Filter	Calculated from from Color Analyzer Curve and Filter Transmission	Observed with G. E. Reflection Meter
	Green Carrara Glass		
1	53.0	50.0	55.0
2	36.5	35.0	38.0
3	33.0	36.0	34.0
4	40.0	40.0	35.0
5	55.0	54.0	51.0
6	50.0	49.0	48.0
7	35.5	34.0	37.0
8	29.0	31.0	30.0
	Appleton Orange Paper		
1	8.0	7.9	6.0
2	7.0	6.8	5.0
3	6.5	6.8	5.0
4	6.0	6.1	5.0
5	10.0	13.8	12.0
6	59.0	58.5	52.0
7	80.0	83.0	79.0
8	85.0	85.0	83.0
	Yellow Bond Paper		
1	15.0	14.4	13.5
2	13.0	13.5	12.5
3	13.5	14.7	14.0
4	22.0	22.3	20.0
5	45.0	49.0	44.0
6	77.0	76.4	77.9
7	82.0	85.0	85.0
8	85.0	86.0	83.0
	Coated Green Paper		
1	35.0	34.7	34.0
2	33.0	34.4	38.0
3	35.0	38.5	38.0
4	61.0	59.0	53.0
5	67.0	65.0	64.0
6	42.0	42.0	43.0
7	27.0	50.5	31.0
8	27.0	40.0	46.0

These results indicate that the upper limit of the disagreement between the two sets of reflectances should be

about 5%. The two exceptions to this generalization occur for filters 7 and 8 for the green coated paper. Here, the disagreement is approximately 20%.

The effective wave lengths for the Wratten filters as given in Part I of the report were calculated from the following equation:

$$\text{Effective wave length} = \frac{\Sigma\, T_s \lambda\, \Delta\, \lambda}{\Sigma\, T_s\, \Delta\, \lambda},$$

where λ is the distance in millimicrons from that λ for which T_s vanishes.

These effective wave lengths were recalculated for the case of the usual $CuSO_4$ filter in addition to the auxiliary $CuSO_4$ filter. The effective wave lengths for this case are:

Filter	Effective λ in millimicrons
1	450
5	532
8	624
9	671

It is apparent that the "effective wave length" is not changed for filters 1 and 5. However, an appreciable change occurs for filters 8 and 9, due to the decreasing transmission of the $CuSO_4$ in this range.

Auxiliary Heat Filter

As seen from the comparison of theoretical and analyzer reflectances in Table IIb, the results of the color measurement on the analyzer and the reflection meter are expected to correlate closely. In general the greatest disagreement occurs in the violet, blue, and red portions of the spectrum. Typical results for a representative group of samples are given in Table III. For the extreme cases, highly saturated colors, it is seen that the reflectances disagree by as much as 60%. Disagreement of such a magnitude is all out of proportion to what is theoretically expected. In searching for the cause of this discrepancy, a $CuSO_4$ filter, similar to that used as standard in the reflection meter, was placed immediately on top of the dust shield. Reflectance readings were again taken for the samples quoted in Table III. The results of these

TABLE III.—COMPARISON OF THE REFLECTION METER REFLECTANCES WITH THOSE OF THE ANALYZER FOR WAVE LENGTHS 430 AND 650 MILLIMICRONS WHEN NO AUXILIARY HEAT FILTER IS USED IN THE REFLECTION METER

Sample	Wave Length	Hardy Color Analyzer	G. E. Reflection Meter
Blue Cover Paper	430	31%	40%
	650	5%	27%
Purple Cover Paper	430	22%	29%
	650	16%	35%
Yellow Cover Paper	430	17%	17%
	650	78%	85%
Red Cover Paper	430	7%	10%
	650	68%	60%
Green Carrara Glass	430	36%	84.7%
	650	29%	97.0%
Green Coated Paper	430	33%	48%
	650	27%	76%
Green Poster Paper	430	37%	49%
	650	39%	52%
Yellow Poster Paper	430	23%	25%
	650	78%	83%
Gray Carrara Glass	430	47%	51%
	650	46%	52%

measurements are given in Table IV. These results indicate agreement between the reflection meter and the analyzer to within five per cent, for all samples excepting one. For this exceptional case, the red sample, the disagreement is about 20 per cent. The reason for this last discrepancy is found in the extremely low transmittance of the $CuSO_4$ filters.

To ascertain whether the variations in the reflectances caused by simply interposing a $CuSO_4$ filter between the sample opening and the photocell were caused by a peculiarity of the incident or of the reflected beam, the $CuSO_4$ filter was placed between the source of light and the sample opening. Reflectances taken with the filter in this position were still too far off to check the analyzer curves. These results point to the fact that the differences obtained by simply interposing a $CuSO_4$ filter between the sample and the dust shield are due to the spectral character of the reflected light being changed much more than to be expected from theoretical considerations.

TABLE IV.—COMPARISON OF THE REFLECTION METER REFLECTANCES WITH THOSE OF THE ANALYZER FOR WAVE LENGTHS 430 AND 650 MILLIMICRONS WITH THE JENA BG-18 FILTER IS USED AS THE AUXILIARY HEAT FILTER IN THE REFLECTION METER

Sample	Wave Length	Hardy Color Analyzer	G. E. Reflection Meter
Blue Cover	430	31%	31%
	650	5%	4%
Purple Cover	430	22%	21%
	650	16%	11%
Yellow Cover	430	17%	13%
	650	78%	79%
Red Cover	430	7%	7%
	650	68%	50%
Green Carrara	430	36%	38%
	650	29%	30.7%
Green Coated	430	33%	35.5%
	650	27%	26%
Green Poster	430	37%	43%
	650	39%	40%
Yellow Poster	430	23%	25%
	650	78%	83%
Gray Carrara	430	47%	45%
	650	46%	44%

The possibility that the differences might be caused by the photocell seeing reflected light from parts of the instrument case other than the sample opening was investigated. Various black paper shields, and paper and black felt apertures, were arranged to screen off parts other than the sample opening. It was shown that the discrepancies could not be caused by light scattered from the surroundings of the sample opening. In addition, the plate current was observed as the sector was opened with the sample removed from the sample opening. If light was scattered into the photocell, the plate current would have changed during the rotation of the sector. However, the plate current reading remained constant. This showed that there was an inappreciable amount of light scattered from the surroundings of the sample opening. (The room was darkened to remove the difficulty of light from the room entering the sample opening.)

From the foregoing paragraphs it is to be concluded that results consistent with the analyzer may be obtained on the reflection meter by the use of the auxiliary filter. It was found that any one of three filters was useful in obtaining this agreement. These filters included the standard $CuSO_4$, the Jena BG-18, and the Corning Aklo heat filter. The generalization to be drawn from these observations is that any heat filter which has a fairly uniform transmission characteristic for the visible spectrum, and a very low transmission for those wave lengths of the infra-red between 700 and 1200 millimicrons, will serve the purpose of the auxiliary filter.

As mentioned above, the introduction of the auxiliary heat filter did not change the reflectance values for certain samples. As a particularly illuminating example of this fact, we may consider the reflectance values obtained with two transparent green cellophane films placed immediately over a white paper reflecting surface. In this case, the two samples present the same surface characteristics, and the same material structure, the only point of difference between the two samples being that one was a light green and the other of a dark green color. The light green cellophane film placed over the white paper gave reflectance values which agreed with each other, for the cases of the auxiliary filter both in and out of the light beam. On the other hand, the dark green sample under similar conditions gave rise to glaring discrepancies for the cases of the auxiliary filter in and out of the beam. These points are graphically illustrated in Figs. 34 and 35,

in which the curves are the analyzer curves for the samples and the plotted points are the reflection meter data. The data are given in Table V.

TABLE V.—CHANGE IN REFLECTANCE OF TWO GREEN CELLOPHANES BACKED BY STANDARD NO. 15, WHICH IS CAUSED BY INTERPOSING A $CuSO_4$ FILTER BETWEEN THE SAMPLE AND THE PHOTOCELL ON THE REFLECTION METER

Filter No.	Dark Green Backed by No. 15		Light Green Backed by No. 15	
	With $CuSO_4$ Filter	Without $CuSO_4$ Filter	With $CuSO_4$ Filter	Without $CuSO_4$ Filter
1	1.6	19.0	15.4	16.5
2	0.0	0.0	1.5	1.5
3	0.5	37.0	.5	9.0
4	11.0	17.0	43.5	44.0
5	14.6	22.0	47.0	46.0
6	2.8	23.0	27.0	26.5
7	1.0	16.5	16.8	16.4
8	0.0	75.0	14.0	16.0

Before these two cases were cited, it might validly have been asked if the discrepancies without the use of the auxiliary filter might not be attributed to some property of the standards used. This point could not be maintained in view of the discrepancies persisting, regardless of the use of the $MgCO_3$, Carrara glass, or white paper standards of reflectance.

The Reason for the Use of the Auxiliary Filter

The discussion thus far indicates that the discrepancies between the analyzer and the reflection meter data taken with and without the use of the auxiliary filter are due to properties of the individual samples. From this point of view a reasonable explanation of the following observations must be found: (1) The differences are larger on some samples than on others, (2) the differences are greater for some wavelengths than for others, and (3) the magnitude of the discrepancies.

The best hypothesis as to the cause of the differences with and without an auxiliary filter seems to be that the samples for which there are observable differences emit by fluorescence a near infra-red radiation. This means that a certain fraction of the visible light falling on the sample is absorbed and then reemitted in the near infra-red part of the spectrum.

This hypothesis of a near infra-red fluorescence will be substantiated and employed to explain the observed differences for the cases of the auxiliary filter in and out of the light path between the sample and the photocell. The important results bearing out this hypothesis are the following:

1. For all samples, the reflectances obtained with the auxiliary filter in the light beam between the source and the sample were not sensibly different from those obtained without the auxiliary filter.

2. For all samples for which there was an appreciable discrepancy between the reflection meter and the analyzer curves, the two sets of data were practically in agreement when the auxiliary filter was placed anywhere in the light beam between the sample and the photocell.

3. A filter which transmits practically no visible radiation but does transmit the near infra-red radiation was placed in the light beam between the sample and the photocell with the Carrara green sample over the sample opening a deflection of 40 microamperes plate current was obtained with filter 8 before the photocell when the sector diaphragm was completely open. This deflection was reduced to zero when the Jena filter was placed in the same beam in addition to the infra-red filter. However, the deflection persisted when the Jena filter was placed in the beam between the source of light and the sample, with the infra-red filter still in its original position. These results demonstrate the fact that the Carrara glass sample is acting as an emitter of an infra-red radiation which was not present in the incident beam. The data for this same set-up for samples in addition to the representative Carrara glass are given in Table VI. The data of Table VI, as well as the discrepancies shown in Table III, suffice to indicate that some samples fluoresce more strongly than others. It is then understood why the discrepancies occur for some samples and not for others.

TABLE VI.—AMPLIFIED PHOTOCURRENT DUE TO NEAR INFRA-RED FLUORESCENCE OBTAINED WITH AN INFRA-RED TRANSMITTANCY FILTER PLACED OVER THE DUST SHIELD

Sample	Current in Microamperes
Carrara Green	40
Yellow Cover	20
Yellow Coated	18
Brown Cover	20
Red Cover	18
Yellow Poster	18
Blue Cover	19
White Cararra	10
White Paper	10

The second point now arises: The variation of the differences with the wave length for the filter being used on the reflection meter. It is now assumed that the sample is emitting fluorescent infra-red light. This infra-red light will be incident on each of the gelatin filters as it is turned into place before the photocell. The infra-red transmittance varies from filter to filter. For the sake of argument, it will be assumed that the filters are equally transparent to the near infra-red. Hence, for each of the filters there will be an essentially constant plate current error due to the photocurrent liberated by the infra-red light. This current due to the infra-red radiation is treated as an error, since it is additive to that plate current due to the visible light which the given filter transmits.

The effect that this constant plate current error will have on the measured reflectances must be considered in terms of the sensitivity of the measurements for the individual filters. It will be recalled from the consideration of sensitivity as given in Table IV of part I, that the sensitivity or microampere change in plate current per one per cent change in light energy varies from 3 microamperes for a one per cent change in light energy for filter 3 to a maximal value of 25 microamperes for filter 4. The per cent error in the reflectance measurement due to the infra-red fluorescent light is given by the following ratio:

$$\text{Error} = \frac{\text{Plate current due to infra-red}}{\text{Plate current due to the visible}} \times 100$$

If an error of 50 microamperes plate current due to the infra-red light is assumed, the calculated percentage error in the reflectance for a sample of 50 per cent diffuse reflectance becomes 50 per cent for filter 3, 25 for 8, and 10 per cent for 5. These results are consistent with the fact that, for all samples, the maximal disagreement when an auxiliary filter is not used occurs for filters 3 and 8. Therefore it must be concluded that the apparent variation of the differences with the filter which is used is to be attributed to the variation of the sensitivity of the reflection meter from filter to filter, as well as the variation of the infra-red transmittance.

The third point deals with the magnitude of the discrepancies. The question arises: How is one to account for a discrepancy of as much as 60 per cent on some samples. It is in answer to this question that the following data are given.

Filter 5 of the reflection meter (74 of the Wratten series) has the following transmission values as taken from the Eastman filter data, given in the Wratten filter book (1934). This filter has a total transmission of about 5 per cent from wave lengths 700 to 800 millimi-

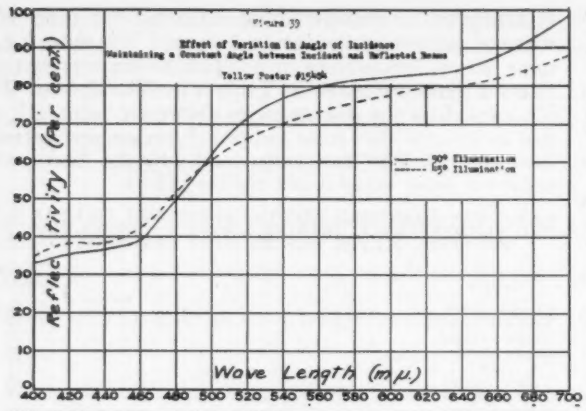


Figure 39
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
Yellow Poster #15404
50° Illumination
45° Illumination
Reflectivity (Per cent)
Wave Length (mμ)

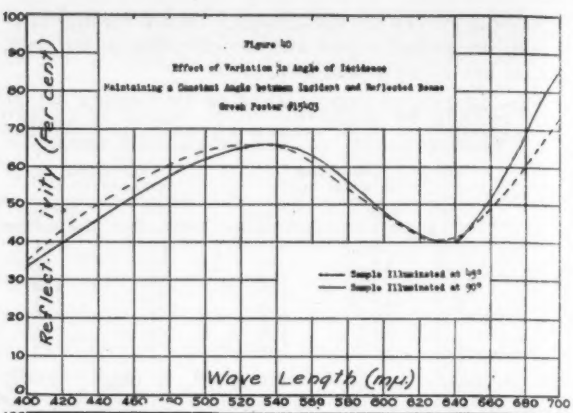


Figure 40
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
Green Poster #15403
Sample Illuminated at 45°
Sample Illuminated at 90°
Reflectivity (Per cent)
Wave Length (mμ)

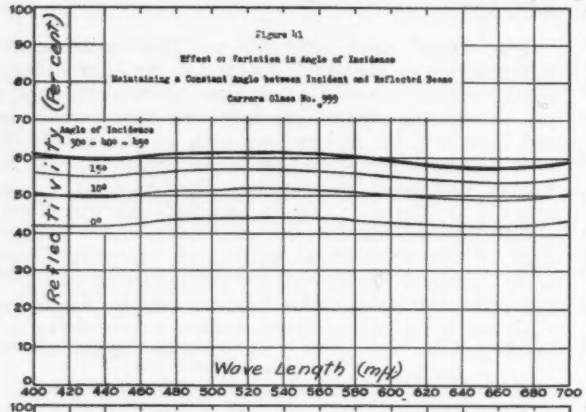


Figure 41
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
Carrara Glass No. 999
Angle of Incidence
30° - 40° - 45°
15°
10°
0°
Reflectivity (Per cent)
Wave Length (mμ)

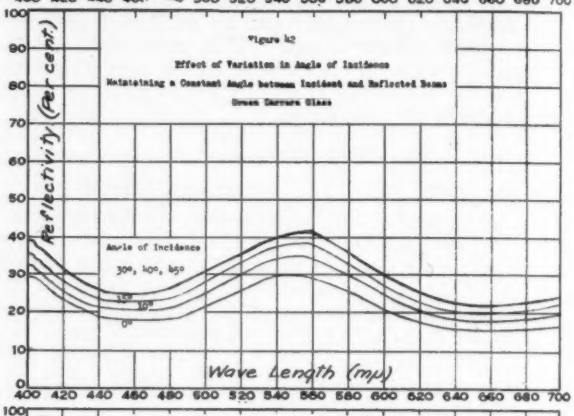


Figure 42
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
Green Carrara Glass
Angle of Incidence
30°, 40°, 45°
15°
10°
0°
Reflectivity (Per cent)
Wave Length (mμ)

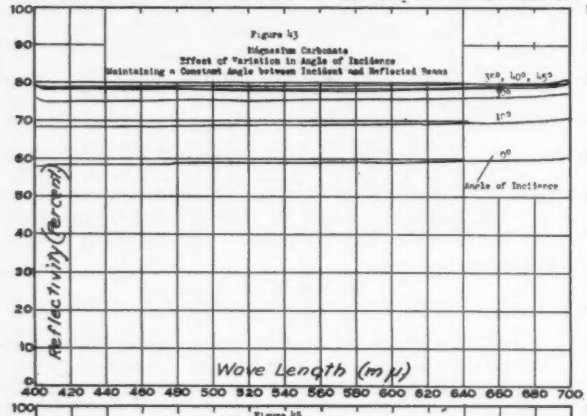


Figure 43
Magnesium Carbonate
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
30°, 40°, 45°
15°
10°
0°
Angle of Incidence
Reflectivity (Per cent)
Wave Length (mμ)

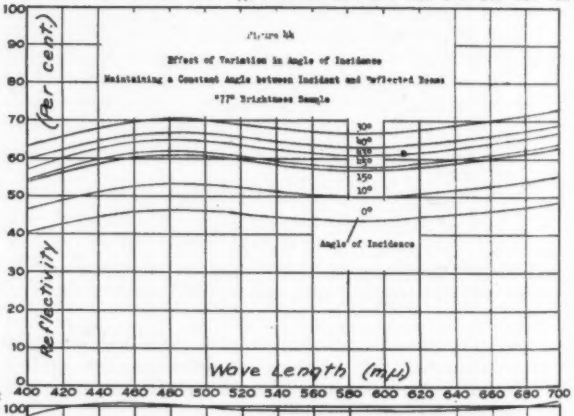


Figure 44
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
"77" Brightness Sample
30°
40°
45°
15°
10°
0°
Angle of Incidence
Reflectivity (Per cent)
Wave Length (mμ)

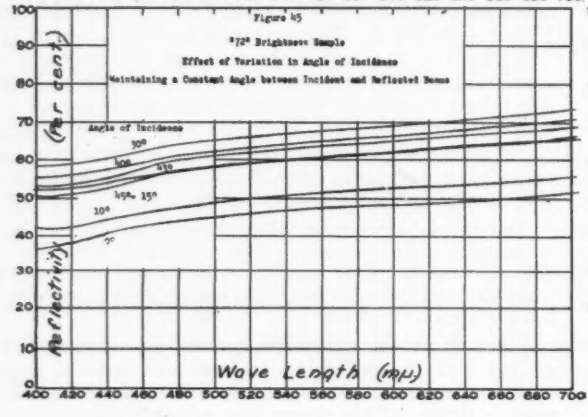
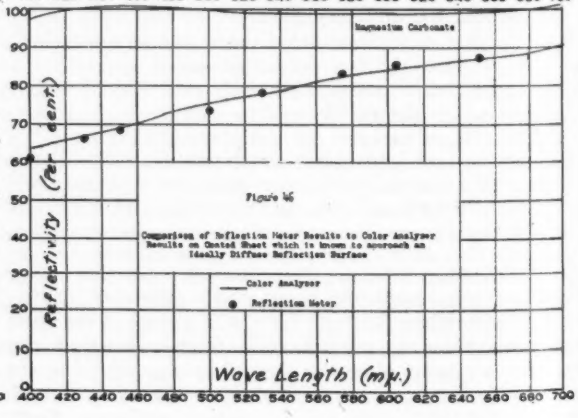


Figure 45
"72" Brightness Sample
Effect of Variation in Angle of Incidence
Maintaining a Constant Angle between Incident and Reflected Beams
Angle of Incidence
30°
40°
45°
15°
10°
0°
Reflectivity (Per cent)
Wave Length (mμ)


Magnesium Carbonate
Figure 46
Comparison of Reflection Meter Results to Color Analyzer Results on Coated Sheet which is known to approach an Ideally Diffuse Reflection Surface
Color Analyzer
Reflection Meter
Reflectivity (Per cent)
Wave Length (mμ)

FIGS. 39-46

crons. This filter, 5, combined with filter 8, which itself transmits about 8 per cent of the energy from 600 to 700, is visually opaque to the focussed beam of the 50 candle power headlight lamp. Hence, the simultaneous use of both filters absorbs practically all of the visible radiation from 400 to 700, while the combination transmits only 5 per cent from 700 to 800 millimicrons and 50 per cent from 800 to 900 millimicrons of that transmitted by filter 8 alone.

Data given in Table VII show the plate currents due to the light from the sample for the case of filter 8 and for the combination of 8 and 5. The samples included in the data are the Carrara green, the Carrara white, and the green coated paper. Since large discrepancies were observed for the case of filter 3 as well as for 8, data similar to that in Table VII for the cases of filter 3 alone and in combination with 8 are given in Table VIII The results of these data indicate that, for the combination of filters 5 and 8, 25, 5, and 10 per cent of the total plate

TABLE VII.—AMPLIFIED PHOTOCURRENT DUE TO NEAR INFRA-RED FLUORESCENCE OF THE SAMPLES

A—Current due to sample + null reading.
B—Current due to null reading.
C—Current due to sample = A — B.
All values are in microamperes plate current.

Filter No.	Green Coated Paper			Green Carrara			White Carrara		
	A	B	C	A	B	C	A	B	C
8	240	145	95	240	128	112	240	140	100
8 + 5	142	135	7	142	110	32	140	135	5

TABLE VIII.—AMPLIFIED PHOTOCURRENT DUE TO INFRA-RED FLUORESCENCE OF THE SAMPLES

A—Current due to sample + null reading.
B—Current due to null reading.
C—Current due to sample = A — B.

Filter No.	Green Coated Paper			Green Carrara			White Paper		
	A	B	C	A	B	C	A	B	C
8	208	170	38	240	165	75	240	165	75
3 + 8	185	175	10	200	165	35	177	172	5

current is caused by the infra-red light transmitted by filter 5, for the samples in the order above quoted. For the 3 filter in combination with 8 we have 47, 6, and 26 per cent of the total plate current caused by the fraction of the infra-red fluorescent radiation transmitted by the 8 filter. These data, in addition to the above mentioned infra-red transmittance values of filters 5 and 8, show that there is sufficient infra-red light available to explain the fact that, for some samples, the photocurrent due to the infra-red fluorescence is of the same order of magnitude as that due to the visible light transmitted by the given filter.

The hypothesis of an infra-red fluorescence appears to be sufficiently established to be a real effect. The question then arises as to the possibility of the reflectances as measured on the analyzer being in error due to this same cause of an infra-red fluorescence. If the analyzer reflectances were in error on account of this fluorescence, the reflectances as obtained with a near infra-red absorbing filter between the samples and the photocell should be different from those obtained with this same filter interposed between the light source and the sample, just as was observed for the reflection meter. In order to test this point, analyzer curves were run for the Carrara green glass sample, for the cases of the Corning Aklo filter placed first between the light source and the sample, and then for this filter placed between the sample and the photocell. The curves of Figs. 36 and 37 represent the reflectances of the number 15 white standard and of a green coated paper (which showed appreciable fluorescence) after the light had passed through the Corning Aklo heat filter; first, before reaching the sample, and second, after having been reflected from the sample. The reflectances of the green paper are given in Table IX.

TABLE IX.—REFLECTANCES AS DETERMINED ON THE HARDY COLOR ANALYZER USING A CORNING FILTER IN THE INCIDENT AND THEN IN THE REFLECTED BEAM IN AN ATTEMPT TO DETECT THE PRESENCE OF INFRA-RED FLUORESCENCE OF THE SAMPLES

Wave Length	Filter in Incident Beam	Filter in Reflected Beam
440	40.5	40.5
480	65.0	65.0
500	81.0	80.0
520	82.7	84.5
560	63.0	64.3
600	37.4	38.4
640	25.4	25.6
660	39.7	39.4
690	82.0	81.0

It is seen that there is no difference between the reflectances so determined. Consequently, it was concluded that the near infra-red fluorescence was not measurable on the analyzer instrument.

The reason for the fluorescence not being a source of appreciable error on the analyzer, while being a very important source of error on the reflection meter, is to be found in the difference between the method of illuminating the samples on the two instruments. The sample is illuminated by a monochromatic beam of approximately 10 millimicrons wave length spread for the analyzer.

However, on the reflection meter the sample is illuminated by the whole visible spectrum emitted by the 50 c.p. lamp, which is transmitted by the usual $CuSO_4$ filter. If one were to assume that the whole spectrum is capable of exciting this near infra-red fluorescence, then it is seen that the intensity of the fluorescent light for the analyzer instrument would be about 5 per cent of that occurring on the reflection meter. This is of course due to the fact that this same percentage represents the ratio of the energy of the 10 millimicron wave length band to that of the complete visible spectrum.

This argument demonstrates that the magnitude of the error to be expected from this infra-red fluorescence depends directly on the intensity of the visible spectrum falling on the sample. The question now presents itself with regard to the reflection meter. Would the reflectances as determined with an auxiliary heat filter be sensibly different from those values determined without the use of the auxiliary filter, if the light falling on the sample were first to pass through the monochromatizing filters.

In order to answer this question definitely, filters 1 to 8 were removed from the filter wheel and placed in the light beam between the source of light and the sample. The reflectances for the green Carrara glass, the green coated paper, and an 82 per cent reflectance white bond paper were determined with the monochromatizing filters in this position, both for the case of the Jena BG 18 filter

TABLE X.—REFLECTANCES AS DETERMINED WITH WRATTEN FILTERS IN THE INCIDENT BEAM INSTEAD OF BEING IN THE REFLECTED BEAM

Sample	Filter	Reflectances	
		No Jena	Jena on Dust Shield
Green Carrara	1	35.6	...
	2	...	...
	3	41.8	38.1
	4	36.7	35.5
	5	51.0	50.6
	6	47.3	47.0
	7	37.1	37.5
	8	31.8	32.0
Appleton Green	1	41.3	...
	2	...	...
	3	40.1	35.3
	4	56.6	56.0
	5	64.3	63.4
	6	44.6	42.9
	7	32.2	31.5
	8	29.0	20.3
White Paper	1	84.1	...
	2	...	...
	3	84.0	82.7
	4	82.7	82.5
	5	79.1	78.8
	6	78.6	77.8
	7	80.3	79.2
	8	83.6	79.1

placed in the light beam between the source and the sample, and between the sample and the photocell. These reflectances are given in Table X. The data indicate no appreciable differences in the measured reflectances except, again, for the filters 3 and 8. These differences are small compared to those differences observed when the monochromatizing filters were used in their usual positions in the filter wheel.

These results indicate that consistent agreement may be obtained on the reflection meter by a simple change of the Wratten monochromatizing filters from the position now used to a position in the light beam between the source and the sample. The reason for this consistency is that the energy of the light incident on the sample is now about 10 per cent of that of the whole visible spectrum, and consequently the energy of the fluorescent light is cut down by approximately this same ratio.

As the instrument is now designed and used, it is much cheaper and far less troublesome to use the monochromatizing filters in the usual position and add only the Jena heat filter as an auxiliary filter, in order to obtain results consistent with those of the analyzer. A precaution must be noted here. When using filters 3 and 8, in conjunction with the auxiliary Jena filter, a magnifying glass for reading the plate current meter needle, in addition to taking at least three readings, is necessary for an accurate reflectance. This precaution is called for in view of the low sensitivity of the reflection meter for these filters.

The Difference Attributable to Angle of Illuminating and Viewing the Samples

Since the large discrepancies between the results of the reflection meter and the analyzer instruments are removed by the use of the auxiliary filter on the reflection meter, the small differences which persist will now be considered. Under point 4, which was treated in the section on the theory of the measurement of reflectance, mention was made of the differences which might arise due to the difference between illuminating the sample at 90 degrees with the surface and viewing it at 45 degrees, and illuminating at 45 degrees and viewing at 90 degrees. It should be noted that these two methods of illuminating and viewing the samples for the determination of diffuse reflectances are generally assumed to be reciprocal optical arrangements. In other words, the reflectances for the given samples against MgO or $MgCO_3$, arbitrarily assumed to be 100 per cent, will be the same for both angles of illumination. As an excellent example of this statement, the reflectances as determined on the reflection meter and the analyzer are given for a coated sheet (sample 5414) in Fig. 46. It will be recalled that these two measurements represent the extremes, cases for which maximal deviation is to be theoretically expected on account of the large difference of solid angles existing for the two instruments. However, the remarkably close agreement of the analyzer and reflection meter reflectances for this sheet gives experimental verification to the statement regarding the reciprocal relation between the two angles of illuminating and viewing the samples for surfaces which represent approximations to the ideal diffuse reflecting surface. This sample (5414) has been found from independent measurements to be a close approximation to an ideal diffuse reflecting surface. The differences which might arise are due to the derivations of the reflectances from those to be expected from a sample which obeys Lambert's law. Lambert's law states that, for an ideally diffusely reflecting substance, energy per unit solid angle of the diffusely reflected light is directly proportional to the cosine of the angle between the reflected beam and the normal to the reflecting surface.

In order to investigate the differences in apparent reflectance for those two methods of illuminating the samples, a series of papers including yellow posters, a green poster, and two samples of white bond, were run on the analyzer for both angles of illumination. The standard was number 15 white for the poster papers, while $MgCO_3$ was the standard used with the white bond papers. The analyzer reflectance curves are given for the poster papers in Figs. 38-40 for both the 90 and 45 degree cases of illumination. The curves are here quoted for the case of the number 15 standard assumed to be of 100 per cent reflectance. The data are tabulated in Table XI.

TABLE XI.—HARDY COLOR ANALYZER REFLECTANCES OF YELLOW POSTER PAPER SAMPLES FOR THE CASES OF THE SAMPLES ILLUMINATED AT 45 DEG. AND 90 DEG. WITH THE SURFACE OF THE SAMPLES

	Sample No. 15404 Reflectance at		Sample No. 15403 Reflectance at		Sample No. 15483 Reflectance at	
Wave Length	45°	90°	45°	90°	45°	90°
400	34.9	33.2	34.9	34.2	32.3	31.3
420	38.6	35.6	43.8	40.7	32.5	31.6
440	38.0	35.7	49.4	45.7	31.4	30.7
460	42.8	39.1	55.7	52.2	36.4	34.5
480	52.3	50.8	60.8	58.4	49.3	48.9
500	61.8	62.6	64.1	62.2	61.9	66.7
520	66.9	71.9	65.8	66.1	69.7	75.1
540	70.8	76.7	65.3	65.8	73.3	79.3
560	73.3	79.8	60.9	63.8	76.5	81.8
580	75.7	81.8	54.3	55.8	78.3	83.4
600	77.8	82.8	48.2	48.7	79.9	84.8
620	79.2	82.8	41.3	41.4	81.6	85.3
640	80.7	84.8	41.3	40.9	83.1	87.8
660	82.4	89.9	50.0	53.2	84.8	91.8
680	85.5	94.9	61.9	72.6	87.0	95.7
700	88.5	99.2	74.0	87.1	90.0	99.2

The curves for the yellow samples show the reflectances to be low for the 90 degree illumination condition from wave length 400 to 480 millimicrons and high for the same angle from 480 to 700 millimicrons. It will be noted that the curves cross each other. It then becomes evident that a constant factor may not be applied to the reflectances in order to obtain agreement over the whole spectrum for these yellow samples. The same is true for the green poster sample. The conclusion to be drawn is that the discrepancies observed for the two angles of illumination are functions of the wave length. It may be stated that these differences should be visually observable. These results demonstrate that the deviation from Lambert's law, which is to be expected for certain papers, is a function of the wave length. It was not at first certain that these deviations were not attributable to the behavior of the white glass standard under these different illumination conditions. Curves for the Carrara glass (white and green), $MgCO_3$, and the two bond papers above mentioned were obtained with a variation of the angle of the incident beam with the sample surface from 90 to 45 degrees.

The curves showing the variation of reflectance with varying angle of illumination are given in Figs. 41-45. In determining these curves all the variables on the analyzer were kept as constant as was possible, except the one factor, the angle of incident of the illuminating beam. The important features of these curves are the following:

(1) The reflectances as a function of the angle of illumination with a fixed angle of 45 degrees between the incident and the reflected beams approach a maximum for $MgCO_3$ and the Carrara glasses. Calculations from these data show definitely that the variations are in agreement with the variations to be theoretically expected for a surface obeying Lambert's cosine law of emission. It is for these samples that it can rightly be said that the 90 degree illumination and 45 degree observation angles are reciprocal to the 45 degree illumination and the 90 degree observation angles. It is this point which serves as a calibrating factor for the instrumental curves and gives rise

to the necessity of believing the differences as observed for the different angles of illumination to be a property of the samples, and not some inaccuracy of the instrument.

(2) The reflectances as a function of the angle of illumination pass through a maximum at an angle of approximately 60 degrees with the sample surface for the two samples of bond papers which were measured. The reflectances then fall off for the angles between 45 degrees and 60 degrees. This result is consistent with the result that the paper surfaces do not strictly obey Lambert's law. It should be emphasized that this maximum at 60 degrees with the surface is not to be confused with the maximum observed at the angle of specular reflection which, in this case, would be for the illumination of the sample at 67.5 degrees with the surface. However, it may be noted that this angle of specular reflection is not sharp for uncoated papers and that the maximum at 60 degrees is really at an advantageous angle for showing deviations from Lambert's law.

The differences as observed for the samples of yellow paper for the two angles of illumination can partly be accounted for by the decrease in apparent reflectance for standard number 15 as measured against $MgCO_3$ for the 90 degree angle of illumination. This decrease in number 15 reflectance would tend to make the yellow paper values higher for the 90 degree case than for the 45 degree one, similar to what is observed from wave lengths of 470 to 700 millimicrons. However, it must be noted that the reflectance variation of the standard number 15 and the Carrara glasses is practically independent of the wave length for the two angles of illumination. Hence, there still persists a real deviation for certain samples which is a function of the wave length and which would correspond visually to a change of hue as well as of saturation and brilliance of the color. The calculated reflectances for the 45 degree and 90 degree illumination conditions against $MgCO_3$ are given in Table XII.

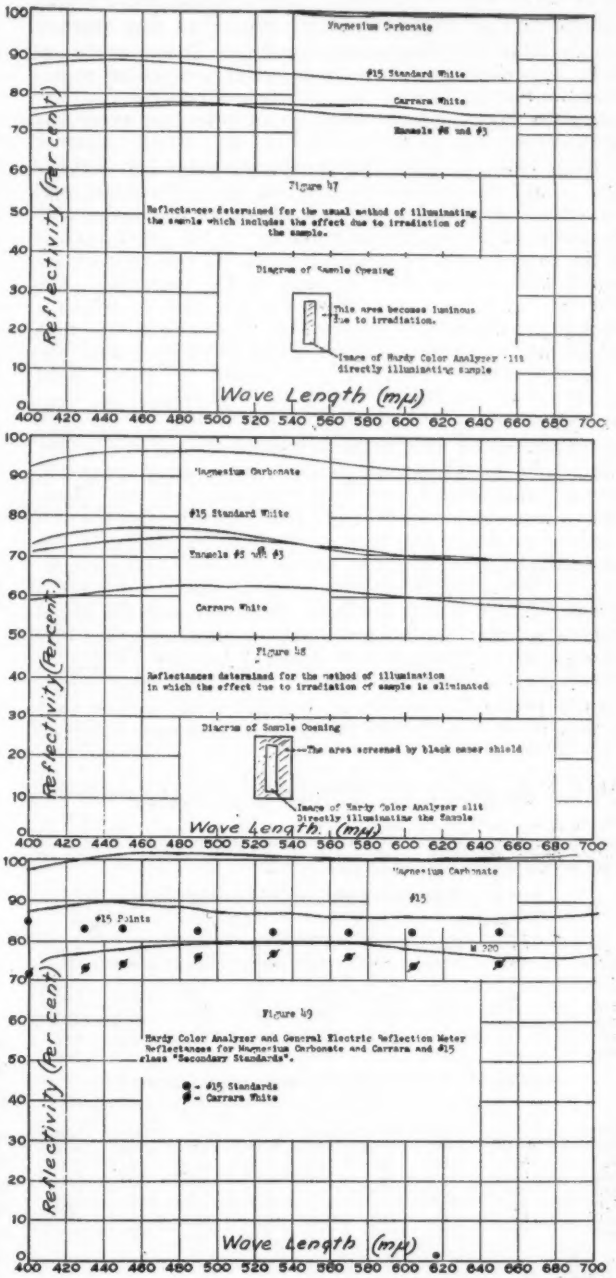
TABLE XII.—HARDY ANALYZER REFLECTANCES OF TWO WHITE PAPERS AND OF TWO CARRARA GLASSES FOR THE CASES OF THE SAMPLES ILLUMINATED AT 45 DEG. AND 90 DEG. WITH THE SURFACE OF THE SAMPLES

Sample	Wave Length	Paper Reflectances	$MgCO_3$ Reflectances	Paper Reflectances in terms of $MgCO_3$ as 100%
77 Paper at 90 deg.	450	45.0	58.5	76.8
	560	44.0	59.0	74.5
	660	46.0	60.0	76.6
77 Paper at 45 deg.	450	60.0	78.0	77.0
	560	58.0	78.0	74.3
	660	61.0	78.0	78.2
72 Paper at 90 deg.	450	42.0	58.5	71.7
	560	47.0	59.0	79.6
	660	50.0	60.0	83.4
72 Paper at 45 deg.	450	53.0	78.0	68.0
	560	60.0	78.0	77.0
	660	64.0	78.0	82.0
Carrara White at 90 deg.	450	42.0	58.5	71.7
	560	44.0	59.0	74.5
	660	42.0	60.0	70.0
Carrara White at 45 deg.	450	60.0	78.0	77.0
	560	61.0	78.0	78.2
	660	58.0	78.0	74.3
Carrara Green at 90 deg.	450	19.0	58.5	32.5
	560	29.0	59.0	49.2
	660	16.0	60.0	26.7
Carrara Green at 45 deg.	450	25.0	78.0	32.0
	560	42.0	78.0	53.8
	660	21.0	78.0	26.9

From the results of Table XII it can be seen that the reflectance of the "72 per cent brightness" paper is at maximum 5 per cent greater for the case of the 90 degree illumination than it is for the 45 degree case, when magnesium carbonate is assumed to be of 100 per cent reflectance. For the "77 per cent brightness" paper the corresponding maximum difference is 1.5 per cent. In contrast to these results, the reflectances for these samples, as measured against the Carrara glass as standard, become, respectively, 10 and 5 per cent greater for the 90 degree illumination than for the 45 degree illumination. The two essential points to be seen from the data are: first, the deviation from Lambert's law is dependent on the nature of the paper; second, the deviation for the Carrara glasses is in the opposite direction from that for the papers. The reason for this behavior of the Carrara glasses will be discussed in the following section. These results preclude the possibility of making a general statement as to what type of correction of the reflection meter reflectances could be made in order to account for differences between reflection meter and analyzer values, which are attributable to the difference in angle of illumination.

Irradiation of the Standard Carrara Glasses

The property of irradiation of the Carrara glass and


Reflectivity (Per cent)
Wave Length (mμ)
Magnesium Carbonate
#15 Standard White
Carrara White
Figure 47
Reflectances determined for the usual method of illuminating the sample which includes the effect due to irradiation of the sample.
Diagram of Sample Opening
This area becomes luminous due to irradiation.
Image of Hardy Color Analyzer slit directly illuminating sample
Figure 48
Reflectances determined for the method of illumination in which the effect due to irradiation of sample is eliminated
Diagram of Sample Opening
The area screened by black paper shield
Image of Hardy Color Analyzer slit Directly illuminating the Sample
#15 Points
Figure 49
Hardy Color Analyzer and General Electric Reflection Meter Reflectances for Magnesium Carbonate and Carrara and #15 glass "Secondary Standards".
- #15 Standards
- Carrara White

FIGS. 47-49

other glass standards plays a very important role in the conversion of diffuse reflectances determined on different instruments to a common scale. The irradiation of the glass standards causes parts of the glass surfaces to become luminous, which in themselves are not illuminated by the light beam falling directly on the surface. The effect of this irradiation in the case of the analyzer reflectances is to give an apparent reflectance for the Carrara glass standards which may be as much as 15 per cent too high. The experiments which illustrate this effect will now be described.

As was noted in the preceding section, the difference in the angles of illuminating and viewing the samples for the reflection meter and the analyzer gave rise to reflectances for the Carrara glasses which were higher for the case of 45 degree illumination than that obtained for the 90 degree illumination condition. These results are in the opposite direction to those which are needed to explain the four to five per cent differences between the Carrara reflectances as determined on the reflection meter and the analyzer which appears in Fig. 49. In consequence of these facts, analyzer curves were obtained for $MgCO_3$, glass standard number 15, Carrara glass standard, and two enamel standards. One set of curves was taken with the image of the light source falling on the front surface of the sample, and illuminating about 25 per cent of the sample area which could be seen by the photocell. The other set of curves was taken for the case in which a black paper diaphragm screened off all of the sample area except that upon which the image of the light source was incident. These results are presented in Table XIII and Figs. 47 and 48, in which the reflectances of Carrara glass, enamels, and glass standard No. 15 for both the diaphragmed and undiaphragmed set-ups are given. The results show that, within the experimental error, the enamel standards are free from irradiation effects. However, it must be noted that the reflectance of the Carrara standard is 14 per cent less for the diaphragmed than for the undiaphragmed sample. The results for similar conditions of the white standard number 15 show a difference of nine. These results are quite consistent with the visual observation that the incident light penetrates further into the samples of Carrara and standard number 15 than it does for the enamel and $MgCO_3$ standards, and consequently, produces a surface glow which is appreciable over an area much larger than the directly illuminated sample area. The irradiation effect is small for opaque bond papers, as well as for the enamel standards and $MgCO_3$. This circumstance permits of choosing the area of the sample diaphragm sufficiently large to obtain extra light from the irradiated surface, such that the reflectance values as determined on the analyzer for 90 degree illumination will be the same as those determined on the reflection meter for the Carrara glasses, as well as for the papers and the enamel standards.

It is to be emphasized here that the method of illumination should be carefully studied when a comparison is made between the results of reflectance measurements on two reflectometers which, from hasty considerations, appear to measure the same reflectance. This is an instance, again, of the fact that the difference in the geometry of two optical setups may be responsible for much larger second-order differences in measured reflectance than is ordinarily expected.

The conclusion to be drawn as regards the irradiation question is that, in the particular case of the white glasses, the irradiated areas were sufficiently different on the reflection meter and the analyzer so that the differences to be expected, due to difference in angle of illumination, were masked by the differences due to this irradiation.

TABLE XIII.—EFFECT OF IRRADIATION ON THE REFLECTANCE OF PAPER, ENAMEL, AND GLASSES

The data for the full aperture mean that the sample area as seen by the photocell is greater than the directly illuminated sample area. The screened aperture results are taken for the case of all of the sample screened off except for the directly illuminated area.

FULL APERTURE (IRRADIATION PRESENT)

	$MgCO_3$		No. 15		Carrara		Enamel	
Wave Length	Observed	Corrected	Observed	Corrected	Observed	Corrected	Observed	Corrected
420	101	100	88.5	87.6	75.0	74.2	76.0	75.2
460	102	100	88.5	86.7	76.5	75.0	77.0	75.5
480	102	100	88.5	86.7	76.5	75.0	77.0	75.5
520	101	100	86.0	85.2	77.0	76.3	76.0	75.2
560	100	100	85.0	85.0	77.0	77.0	75.0	75.0
600	100	100	84.0	84.0	76.5	76.5	74.0	74.0

SCREENED APERTURE (IRRADIATION ABSENT)

	$MgCO_3$		No. 15		Carrara		Enamel	
Wave Length	Observed	Corrected	Observed	Corrected	Observed	Corrected	Observed	Corrected
420	95.0	100	75.0	79.0	60.0	63.0	72.5	76.3
460	96.5	100	76.0	78.6	62.0	64.2	74.0	76.6
480	96.5	100	76.0	78.6	63.0	65.3	74.0	76.6
520	96.5	100	75.5	78.2	63.0	65.2	74.0	76.6
560	94.0	100	73.0	77.5	62.0	66.0	73.0	77.6
600	93.0	100	72.0	77.5	60.0	64.5	72.0	77.5

$$\text{Ratio of Reflectance} = \frac{\text{Reflectance for screened aperture}}{\text{Reflectance for unscreened aperture}}$$ = 0.91 0.86 0.99

Summary of Part II

The theory of the reflectance measurements is treated for both instruments. The discrepancies between the instrumental results to be attributed to the following factors are estimated.

(1.) It is expected that the analyzer reflectances may differ by a maximum of two per cent due to the difference in the solid angles subtended by the condenser lenses of each instrument.

(2.) Discrepancies due to the differences of the spectral distribution of the incandescent sources of light are expected to be of the order of two per cent.

(3.) The differences due to the angles at which the samples are illuminated and viewed are shown to be as much as five per cent for specific samples.

(4.) The effect of the spectral transmission curves of the filters is treated. Transmission curves for all of the filters are reproduced. The Jena filter is found to be less desirable for highly saturated red colors than is the copper sulphate filter, because of its low transmittance from 600 to 700 millimicrons.

(5.) The differences in photocell sensitivity may contribute discrepancies of at most three per cent.

(6.) The theoretical reflection meter reflectances are calculated under certain simplifying assumptions. Sample calculations for the determination of these theoretical reflectances are reproduced. The theoretical reflectances agree on the average to within two per cent of those reflectances observed on the analyzer at the "effective wave length" of the given filters.

(7.) The equations used in the calculation of the "effective wave length" of the filters are given.

Data are presented which show that, with the exception of a few specific cases when papers are deep red in color, the maximum deviation is within 5 per cent reflectance of the value recorded by the analyzer (*see* section on "The Reason for the Use of the Auxiliary Filter"). Experiments are cited which show that the discrepancies observed with and without the use of the auxiliary filter must be associated with the existence of an infra-red fluorescence of some of the samples. The hypothesis of a near infra-red fluorescence suffices to explain all the observed discrepancies arising out of the use of the auxiliary filter.

Data are presented with argument which shows that the

infra-red fluorescence is not observable on the Hardy color analyzer. The reflectances as obtained with the monochromatizing filters in the beam which is incident on the sample are practically in agreement with the analyzer values. Precautions necessary in using the number 3 and 8 filters in conjunction with the auxiliary heat filter are indicated

Analyzer data are quoted which indicate that the reciprocity between the 90 degree illumination and 45 degree viewing condition and that of the 45 degree illumination and 90 degree viewing may be in error by as much as 5 per cent. It is also shown that this difference is a function of the wave length.

The property of irradiation of the opal glass secondary standards is shown to account for differences observed between the Hardy color analyzer and the General Electric reflection meter reflectances for these glasses. It is shown that the irradiation effect may cause differences in reflectance as measured on the two instruments by as much as 15 per cent.

In conclusion, the fundamental purpose of this investigation should be recalled. The purpose of the study was to ascertain whether or not the General Electric reflection meter could be used as a color analyzer. The original designers of the instrument had intended that the instrument be so used.

In order to make this study, the reflectance measurements obtained on the Hardy color analyzer were chosen as our reference standards. The primary reason for this choice was that the Hardy color analyzer gave well defined spectrophotometric results which are comparable with those results of other spectrophotometers (visual and photoelectric) which are used in many laboratories. Hence, the reflection meter results which permitted of close correlation with those of the Hardy color analyzer may be argued to be of general validity, and may be expected to correlate with the spectrophotometric data obtained for samples illuminated and viewed in a manner similar to that used in the reflection meter.

The results of the study show that, for most colors encountered in the manufacture of paper, the reflection meter with the addition of the auxiliary heat filter can be accurately used as a color analyzer. The instrument would appear to provide a good objective means for the standardization of color in the paper industry. However, it must not be inferred from this report that the reflection meter is capable of giving more than a close approximation to the true color analysis of a sample. The complete analysis of color is a measurement for an ideally accurate spectrophotometer. The results obtained with the reflection meter give an accurate approximation to this analysis when the data are used to plot reflectance curves using spectrophotometric curves of papers of similar shades as a guide. Curves for this are in Part I.

Pulp and Paper Industry Literature Review

Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Miscellaneous Digesting Processes

The Cooking Process. IX. Pulping Wood with Alcohols and Other Organic Reagents. S. I. Aronovsky and Ross Aiken Gortner. Ind. Eng. Chem. 28:1270-1276 (Nov., 1936).—Aspen sawdust was cooked with aqueous solutions of aliphatic monohydroxy and polyhydroxy alcohols and of glucose, mannitol, dioxane and urea. The normal primary alcohols were better pulping agents than the secondary or tertiary alcohols. Normal butyl and amyl alcohols yielded better pulped residues than were obtained with the other alcohols. There appeared to be a definite relation between the aqueous solubilities of the monohydroxy alcohols and their pulping properties. The pulping efficiencies of the alcohols also seemed to be related to the zeta potentials at the cellulose-alcohol interface. Aspen chips cooked with normal butyl alcohol yield a pulp which was comparable to the usual aspen soda pulp in strength characteristics. Coniferous woods were not pulped by butyl alcohol as readily as aspen. The residual liquors of the cooks made with normal butyl and amyl alcohols consisted of two layers; the top alcoholic layer contained the organic substances extracted from the wood, and the lower aqueous layer contained only small quantities of water-soluble substances. This pulping procedure provides a means of obtaining the ligneous material of the wood uncontaminated by inorganic compounds not present in the original wood. Some of the properties of the extracted ligneous material are given. —A.P.-C.

Preparation of Cellulose by the Nitric Acid Decomposition Process. III. Decomposition of Rice Straw with Dilute Nitric Acid. 2. I. Shimoda. Cellulose Ind. (Tokyo) 12:71-75 (1936).—A suitable after-treatment for rice straw which has been decomposed by boiling for 1 hour with 2 per cent nitric acid is digestion at 100° C. with 10 times its weight of 1 per cent aqueous caustic soda; the yield of cellulose is 32 per cent of the straw. The gas evolved during the nitric acid treatment consists of hydrocyanic acid, carbon monoxide, nitrous oxide and carbon dioxide.—A.P.-C.

Pulping Process. Adam Hoche. U. S. pats. 2,058,791 and 2,058,792 (Oct. 27, 1936).—*No. 2,058,791*—Fibrous material is placed loosely in a number of closed tanks connected in series. A 1° to 45° Bé. solution of nitric acid is added to the first tank, together with from 1 to 8 lb. (preferably about 5) of starch or sugar per ton of wood chips, and each of the other tanks is filled with a 1 to 10 per cent sulphuric acid solution. The rise in temperature produced by the reaction taking place in the first tank causes distillation of volatile reaction products into the second tank and is allowed to proceed until the contents of the second tank have been sufficiently disintegrated. This tank is then cut out and replaced by the third tank, and the contents of the second tank are washed yielding a pulp that requires no further bleaching. *No. 2,058,792*—Fibrous material is placed loosely in a number of closed tanks

connected in series that are then filled with a 1 per cent to 10 per cent sulphuric acid solution, and the mass is exposed for from 1 to 5 hrs. to the action of the product formed by bubbling chlorine gas and sulphur dioxide gas through acetic anhydride.—A.P.-C.

Process of Decorticating Fibrous Plants. Albert T. Ratcliff and Richard R. Guice, assignors to The Pine-Felt Corp. U. S. pat. 2,047,130 (July 7, 1936).—Pine needles, corn stalks, etc., are wilted by steam, treated with hot water and steam under pressure, and the fiber is disintegrated by suddenly releasing the pressure.—A.P.C.

Purifying Bast Fibers. George R. Bencraft, assignor to Meigs, Bassett and Slaughter, Inc. U. S. pat. 2,054,779 (Sept. 15, 1936).—Bast fibers such as those of sisal, flax or ramie are purified by boiling in a solution containing sodium sulphite and subsequently boiling in a soap solution, being thus rendered suitable for the manufacture of long-fiber paper.—A.P.-C.

Beating

Mitsumata. V. Relations between the Beating of Mitsumata and the Properties of Its Paper. H. Imai and Y. Saeki. Res. Bull. Govt. Printing Bur., 1936, no. 3:1-13; B. C. A. 1936B:1086.—An increase in the degree of beating of mitsumata increases the breaking length, tensile stretch (S), water-resistance (R), wet expansion (E) and transparency (T), but decreases the bursting and tearing strengths and the stiffness, bulk (V), and whiteness; the folding endurance rises to a maximum and then falls. Paper made from a mixture of free- and wet-beaten mitsumata is usually stronger than paper made from stock beaten in the ordinary way to the same extent; S, R, E and T increase, and the general strength and V decrease, with an increase in the degree of beating.—C.J.W.

Machine for Hydrating and Refining Paper Pulp. Ateliers Neyret-Beylier. Fr. pat. 801,631.—Pulp is refined by passing repeatedly between a pair of horizontal rapidly rotating rolls that are mounted inside a large cylinder that is rotated at such a speed that the stock, after passing between the rolls, is held against the surface of the cylinder by centrifugal force and is removed by means of a scraper when it reaches approximately the top of the cylinder. A series of inclined planes or baffles are provided, either in the top of the cylinder above the scraper, or under the press rolls, to form passages by means of which the stock is fed progressively along the length of the press rolls.—A.P.-C.

The New Smith-Egan Beaters. C. W. Smith. Paper Trade J. 103, No. 18:125-128 (Oct. 29, 1936).—A description of the machine, designed to retain the advantages of the hollander and overcome its disadvantages.—A.P.-C.

Pulp Separating System. Lloyd T. Murphy. U. S. pat. 2,060,685 (Nov. 10, 1936).—In the pulping of waste paper in a continuous breaker beater system, a cylinder type of perforated screen or other rotary screen device is used instead of the usual flat screen.—A.P.-C.

Pulp Refining Apparatus. William V. Knoll, assignor to Mid-West-Fulton Machine Co. U. S. pat. 2,061,662 (Nov. 24, 1936).—The invention provides a beater roll of given dimensions with a large bedplate having more than the usual number of knives, and positive adjusting means for holding the roll at all times in substantial contact with the bedplate. The stock is caused to impinge on the roll blades substantially tangential thereto and at a point immediately adjacent to the bedplate, the speed of the pulp preferably being at least equal to the peripheral speed of the roll.—A.P.-C.

Stuff Treatment Machine and Junk Remover. Charles P. Tolman and James T. Coghill, assignors to The Noble and Wood Machine Co. U. S. pat. 2,042,566 (June 2, 1936).—The material to be treated is fed under pressure and passed in fluid form or in a fluid medium through a treating gap or zone. Means are provided for easily and effectively removing foreign objects. The degree of treatment of the stock at a given rate of throughput is regulated by automatically controlling the shoe pressure in relation to the feed pressure.—A.P.-C.

Staggered Riveted Jordan Lining. Harold D. Stuck and Philip A. De Nault, assignors to John W. Bolton and Sons, Inc. U. S. pat. 2,052,197 (Aug. 25, 1936).—In a pre-assembled jordan lining the knives are locked together by rivets which pass through intervening separators or fillers and are arranged in staggered relation. For example, the knives and separators may be arranged in groups such that group No. 1 consisting of, say, five knives alternating with four separators are held together by long rivets passing through all these knives and separators, and another row of rivets projects from the last knife to hold together a second similar group.—A.P.-C.

Bleaching

Bleaching of Pulp from Pine Stumps. Karl-Erik Neumann. Papier-Fabr. 34, No. 39:353-356 (Sept. 27, 1936).—Pulps produced from pine stumps by alkaline cooking processes have low mechanical strength, but satisfactory chemical properties. They are, therefore, better suited for chemical conversion than for paper making. Experiments with different bleaching methods were made on these pulps; the results with multi-stage bleaching, using hypochlorite or chloride of lime, were not as satisfactory as a combined treatment with chlorine water for preliminary bleaching, followed by an after treatment with chloride of lime or hypochlorite. The first step is carried out for only 5 minutes at 3 per cent consistency and the hydrochloric acid formed is neutralized by the addition of lime; the final bleach should be carried out with not more than 10 per cent available chlorine.—C.J.W.

Delaware Valley TAPPI to Meet

The Delaware Valley Section of the Technical Association of the Pulp and Paper Industry will meet at the Engineers' Club, Philadelphia, Pa., Friday, May 21, at 6:30 P. M. The meeting will consist of a symposium on impregnated papers. The speaker will be Robert B. Rohrer, assistant technical director, Armstrong Cork Company, Lancaster, Pa., and M. J. Vittengl, plant manager of Vinton Mills, E. I. du Pont de Nemours & Co., Brattleboro, Vt.

Dr. Rohrer will discuss the impregnation of felt papers with non-aqueous liquids, specifically asphalt. Mr. Vittengl will discuss the impregnation of absorbent papers with aqueous solutions and dispersions, specifically rubber latex.

Both of the speakers have broad backgrounds of theoretical training and practical experience in their respective fields. The field of absorbent papers as impregnating bases is relatively new in the paper industry, its commercial growth is unusually rapid and its influence on the future of the paper industry appears to be of major importance.

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NEW YORK IMPORTS

WEEK ENDING MAY 8, 1937

SUMMARY

Cigarette paper .....340 cs.
Wall paper .....4 bls., 8 cs.
Paper hangings .....7 bls.
Wall board .....12 bdls.
Newsprint .....13,616 rolls, 239 bls.
Printing paper .....27 cs.
Wrapping paper .....40 rolls, 16 bls., 28 cs.
Drawing paper .....6 cs.
Filter paper .....70 cs.
Filter pulp .....10 crates, 10 cs.
Bristol boards .....2 cs.
Metal coated paper .....5 cs.
Coated paper .....1 cs.
Basic paper .....14 cs.
Photo paper .....3 cs.
Decalcomanias .....2 cs.
Decalcomania paper .....30 cs., 6 drums (duplex)
Tissue paper .....3 cs.
Wood pulp paper .....11 cs.
Gummed paper .....2 cs.
Litho paper .....20 cs.
Paper tubes .....90 pkgs.
Miscellaneous paper .....128 cs.

CIGARETTE PAPER

Champagne Paper Corp., *Paris,* Havre, 240 cs.
Champagne Paper Corp., *Queen Mary,* Southampton, 100 cs.

WALL PAPER

——, *Bremen,* Bremen, 5 cs.
——, *American Farmer,* London, 4 bls., 3 cs.

PAPER HANGINGS

W. H. S. Lloyd & Co., *American Farmer,* London, 7 bls

WALL BOARD

——, *Cliffwood,* Wallvik, 12 bdls.

NEWSPRINT

Perkins Goodwin & Co., *Marchen Maersk,* Hamburg, 456 rolls.
Jay Madden Corp., *Marchen Maersk,* Hamburg, 677 rolls.
——, *Marchen Maersk,* Hamburg, 311 rolls, 98 bls.
N. Y. Evening Journal, *Markland,* Liverpool, N. S., 590 rolls.
N. Y. Tribune, *Markland,* Liverpool, N. S., 1866 rolls.
World Telegram, *Markland,* Liverpool, N. S., 610 rolls.
Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 401 rolls.
Westchester Newspapers, Inc., *Markland,* Liverpool, N. S., 48 rolls.
South Norwalk Sentinel, *Markland,* Liverpool, N. S., 67 rolls.
Parsons & Whittemore, Inc., *Markland,* Liverpool, N. S., 509 rolls.
H. G. Craig Co., *Donpaco,* Donnacona, 293 rolls.
H. G. Craig Co., *Kernic,* Donnacona, 286 rolls.
News Syndicate, Co., *G. T. D.,* Gatineau, 305 rolls
Lunham & Reeve, Inc., *Cliffwood,* Helsingfors, 292 rolls.
Walker Goulard Plehn Co., *Cliffwood,* Helsingfors, 141 bls.
Jay Madden Corp., *Cliffwood,* Helsingfors, 266 rolls.
International Paper Co., *West Kyska,* Dalhousie, 3688 rolls.
International Paper Sales Co., *West Kyska,* Dalhousie, 2240 rolls.
Jay Madden Corp., *Scanmail,* Helsingfors, 419 rolls.
H. G. Craig Co., *A. C. D.,* Donnacona, 292 rolls

PRINTING PAPER

E. Dietzgen & Co., *Estrella,* Marseilles, 17 cs.
R. J. Saunders, *Queen Mary,* Southampton, 8 cs.
——, *Beemsterdyk,* Rotterdam, 2 cs.

WRAPPING PAPER

M. M. Cohen, *Marchen Maersk,* Hamburg, 16 bls.
——, *Marchen Maersk,* Hamburg, 40 rolls.
Keller Dorian Paper Co., *Pr. Monroe,* Marseilles, 28 cs.

DRAWING PAPER

G. Haas, *American Farmer,* London, 3 cs.
H. Reeve Angel & Co., *American Farmer,* London, 3 cs.

FILTER PAPER

E. Fougera & Co., *Queen Mary,* Southampton, 60 cs.
H. Reeve Angel & Co., Inc., *American Farmer,* London, 10 cs.

FILTER PULP

Gerhard & Hey, *Beemsterdyk,* Rotterdam, 10 cs., 10 crates.

BRISTOL BOARDS

Favor Ruhl & Co., *American Farmer,* London, 2 cs.

METAL COATED PAPER

C. H. Forsmann & Co., *Bremen,* Bremen, 5 cs.

COATED PAPER

W. J. Byrnes, *Queen Mary,* Southampton, 1 cs.

BASIC PAPER

Dingelstedt & Co., *Konigstein,* Antwerp, 14 cs.

PHOTO PAPER

J. J. Gavin & Co., *Queen Mary,* Southampton, 3 cs.

DECALCOMANIAS

Phoenix Shipping Co., *Bremen,* Bremen, 2 cs.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., *Laconia,* Liverpool, 30 cs, 6 drums (duplex).

TISSUE PAPER

B. F. Drakenfeld & Co., *Laconia,* Liverpool, 2 cs.
——, Laconia, *Liverpool,* 1 cs.
Columbia Ribbon & Carbon Manfg. Co., *American Farmer,* London, 2 cs.

WOOD PULP PAPER

Mono Service Co., *American Farmer,* London, 11 cs.

GUMMED PAPER

Meadows Wye & Co., *American Farmer,* London, 2 cs.

LITHO PAPER

Senefelder Co., Inc., *Pr. Cleveland,* Hong Kong, 20 cs.

PAPER TUBES

——, *Bremen,* Bremen, 90 pkgs.

MISCELLANEOUS PAPER

Standard Products Cor., *Paris,* Havre, 80 cs.
Horman Schutte Co., *Pr. Monroe,* Genoa, 37 cs.
Columbia Ribbon & Carbon Manfg. Co., *Pr. Monroe,* Genoa, 37 cs.

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Luke, Maryland
Covington, Virginia
Tyrone, Pennsylvania
Williamsburg, Pennsylvania
Cass, West Virginia

RAGS, BAGGINGS, ETC.

———, *Estrella Casablanca,* 256 bls. rags.
E. J. Keller Co., Inc., *Estrella,* ———, 455 bls. paper stock.
———, *Estrella,* Marseilles, 165 bls. dark cottons.
Continental Bank Trust Co., *Estrella,* Marseilles, 290 bls. dark cottons.
Michigan Felt Co., *Venice Maru,* Shanghai, 100 bls. picker waste.
O. Smith & Son Co., *Venice Maru,* Shanghai, 50 bls. cotton waste.
J. J. Ryan & Son, Inc., *Venice Maru,* Kobe, 350 bls. cotton waste.
Michigan Felt Co., *Venice Maru,* Kobe, 100 bls. picker waste.
O. Smith & Son Co., *Venice Maru,* Kobe, 50 bls. picker waste.
Royal Manfg. Co., *Venice Maru,* Kobe, 150 bls. cotton waste, 119 bls. rags.
Brandwein Mazur Co., *Venice Maru,* Kobe, 100 bls. cotton waste.
Hoffman Lion Mills, *Venice Maru,* Kobe, 80 bls. rags.
Williamson Products Co., *Venice Maru,* Kobe, 100 bls. cotton waste.
———, *Venice Maru,* Kobe, 200 bls. cotton waste.
W. Steck & Co., *Tai Shan,* Kobe, 60 bls. rags, 44 bls. hemp waste.
O'Brien Padawer Co., *Tai Shan,* Kobe, 100 bls. cotton waste.
Railway Supply & Manfg. Co., *Tai Shan,* Kobe, 100 bls. cotton waste.
J. J. Ryan & Son, Inc., *Tai Shan,* Kobe, 300 bls. cotton waste.
Chase National Bank, *Laconia,* Liverpool, 44 bls. dark cottons.
Manufacturers Trust Co., *Laconia,* Liverpool, 17 bls. rags.
———, *Laconia,* Liverpool, 34 bls. rags.
D. Benedetto, Inc., *Cliffwood,* Copenhagen, 77 bls. bagging.
Amtorg Trading Corp., *G. Yagoda,* Novorossisk, 266 bls. cotton waste.
Chase National Bank, *G. Yagoda,* Odessa, 1419 bls. flax waste.
Chase National Bank, *G. Yagoda,* Odessa, 2738 bls. rags.
Fleming Joffe, Ltd., *G. Yagoda,* 1340 bls. flax waste.
J. Cohen Son Co., *American Importer,* Manchester, 74 bls. rags.
E. Butterworth & Co., Inc., *American Importer,* Manchester, 132 bls. rags, 40 bls. bagging.
Royal Manfg. Co., *American Importer,* Manchester, 69 bls. cotton waste.
———, *American Importer,* Manchester, 147 bls. cotton waste.
Reis & Co., Inc., *American Importer,* Manchester, 154 bls. cotton waste.
J. Cohen Son Co., *American Importer,* Belfast, 10 bls. paper stock.
M. Snedeeker Corp., *American Importer,* Belfast, 97 bls. paper stock.
Brandwein Mazur Co., *Collamer,* Dunkirk, 64 bls. cotton waste.
Wertheimer Bag Co., *Fort Townshend,* Halifax, 113 bls. bagging.
Brandwein Mazur Co., *Beemsterdyk,* Rotterdam, 81 bls. cotton waste.
Great Eastern Packing & Paperstock Corp., *Beemsterdyk,* Rotterdam, 230 bls. bagging.
Continental Bank Trust Co., *Konigstein,* Antwerp, 267 bls. flax thread waste.
Banco Coml. Italiane Trust Co., *American Farmer,* London, 82 bls. rags.
A. W. Fenton, Inc., *American Farmer, London,* 142 bls. rags.
———, *American Farmer,* London, 46 bls. strings.

RAGS, BAGGINGS, ETC.

Mitsui & Co., Ltd., *Tenyo Maru,* Kobe, 489 bls. cotton waste.
———, *Kinai Maru,* Shanghai, 150 bls. cotton waste.
E. J. Keller Co., Inc., *Ume Maru,* ———, 300 bls. paper stock.
E. J. Keller Co., Inc., *Deutschland,* ———, 100 bls. bagging.
E. J. Keller, Co, Inc, *Maiden,* ———, 50 bls. paper stock.

GLUE STOCK, ETC.

———, *Estrella, Marseilles,* 193 bls. glue stock.
———, *E. Francqui,* Antwerp, 145 bags hide cuttings.
Darmstadt Scott & Courtney, *Tai Shan,* Kobe, 60 bls. fleshings.
American Express Co., *Laconia,* Liverpool, 280 bags hide cuttings.

OLD ROPE

D. Benedetto, Inc., *Estrella,* Marseilles, 69 rolls.
J. F. Keene Co., *American Farmer,* London, 56 coils.
Banco Coml Italiane Trust Co., *American Farmer,* London, 106 coils.
E. J. Keller Co., Inc., *American Farmer,* ———, 39 coils.

WOOD PULP

Bankers Trust Co., *Marchen Maersk,* Hamburg, 496 bls. wood pulp, 99 tons.
Bankers Trust Co., *Marchen Maersk,* Hamburg, 414 bls. wood pulp, 83 tons.
Castle & Overton, Inc., *Marchen Maersk,* Hamburg, 2440 bls. wood pulp, 488 tons.
Perkins Goodwin & Co., *Shanilian,* St. Georges, N. B., 6120 bls. wood pulp, 306 tons.
Castle & Overton, Inc., *Cliffwood,* Helsingfors, 1487 bls. sulphite, 294 tons.
Lagerloef Trading Co., *Cliffwood,* Helsingfors, 1480 bls. sulphate, 160 tons.
Lagerloef Trading Co., *Cliffwood,* Helsingfors, 427 bls. sulphite, 79 tons.
Price & Pierce, Ltd., *Cliffwood,* Wallvik, 582 bls. unbleached sulphite, 92 tons.
Lagerloef Trading Co., *Scanmail,* Helsingfors, 1828 bls. sulphite, 356 tons.
Lagerloef Trading Co., *Scanmail,* Helsingfors, 1250 bls. mechanical pulp, 250 tons.

WOOD PULP BOARDS

Jay Madden Corp., *Cliffwood,* Helsingfors, 320 bls., 47 tons.

PORTLAND IMPORTS

WEEK ENDING MAY 8, 1937

Gottesman & Co., Inc., *Malaren,* Sweden, 1000 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING MAY 8, 1937

Loumar Textile By-Products Co., *Venice Maru,* Osaka, 200 bls. bagging.
Elliott Addressing Machine Co., *Tai Shan,* Yokohama, 7 cs. paper.
———, *American Farmer,* London, 294 bls. waste paper.
M. M. Tushins, *American Farmer,* London, 22 bls. paper stock.
G. A. Henshaw & Son, *American Farmer,* London, 28 bls. paper stock.
Crocker Burbank Co., *American Farmer,* London, 29 bls. waste paper.
Fitchburg Paper Co., *American Farmer,* London, 143 bls. waste paper.
Gottesman & Co., Inc., *Scanmail,* Finland, 254 bls. wood pulp.
Gottesman & Co., Inc., *Malaren,* Sweden, 1250 bls. wood pulp.
Pagel, Horton & Co. Inc., *Liberty,* ———, 2000 bls. wood pulp.
M. Sone, *Maria,* Trieste, 904 bls. wood pulp.

CAMDEN IMPORTS

WEEK ENDING MAY 8, 1937

Lagerloef Trading Co., *Cliffwood,* Helsingfors, 3556 bls. sulphate, 711 tons.
Lagerloef Trading Co., *Cliffwood,* Helsingfors, 612 bls. sulphite, 102 tons.

PHILADELPHIA IMPORTS

WEEK ENDING MAY 8, 1937

E. J. Keller Co. Inc., *Estrella,* ———, 473 bls. rags.
———, *Venice Maru,* Kobe, 258 bls. cotton waste.
———, *Venice Maru,* Kobe, 217 bls rags.

(Concluded on page 70)

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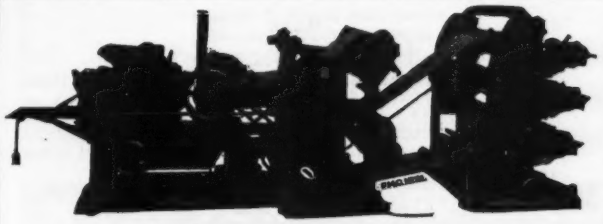

POTDEVIN

MODEL 102—HIGH SPEED

NOTION BAG MACHINE

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, May 12, 1937.

Conditions in the local paper market continue satisfactory. Demand for the various standard grades of paper is fairly active for the season. The contract movement is well up to average for the time of year. Prices are generally holding to schedule.

The position of the newsprint market is practically unchanged. Manufacturing operations in the United States, Canada, Newfoundland and abroad are proceeding close to schedule. Demand from the newspaper publishers is well sustained. Prices are quoted at recently announced levels.

Business in the fine paper market is fairly buoyant. Demand for book, cover, bond and ledger papers is holding up well. Prices are steady. Tissues are moving into consumption freely. The coarse paper market is strong with kraft specialties going forward into consumption freely.

Mechanical Pulp

The ground wood pulp market is steadier. Production in the United States, Canada and abroad is keyed to consumption as far as possible with a view of meeting current requirements. Shipments against contract are moving in satisfactory volume. Prices generally remain unchanged.

Chemical Pulp

There were no further price alterations in the various grades of domestic and imported pulp and recently revised quotations were being maintained. Prime easy bleaching sulphite and strong unbleached sulphite are little changed. Bleached kraft pulp continues stronger while other grades are steady.

Old Rope and Bagging

The old rope market is exhibiting a fairly strong undertone. Demand for domestic and imported old manila rope is well sustained. Small mixed rope is moving in good volume. The bagging market is moderately active. Both scrap and gunny bagging are moving slowly.

Rags

Trading in the domestic rag market is light. Demand for new and old cotton rags is less active than of late, with the exception of No. 1 new white shirt cuttings, which are in request for both domestic and export account. Roofing grades are slower and quotations have receded somewhat.

Waste Paper

The paper stock market is slower. Demand from the board mills for the lower grades has fallen off slightly and quotations are slightly weaker. The higher grades of waste paper are steadier and white envelope cuttings, hard and soft white shavings and book stock are firmer.

Talc

Routine business was transacted in the local talc market. Demand for the various varieties of talc was persistent for the time of year. The contract movement is fairly active for the season. Prices are generally holding to formerly quoted levels and shading is infrequent.

IMPORTS OF PAPER AND PAPER STOCK

(Continued from page 68)

Jay Madden Corp., *Cliffwood,* Helsingfors, 60 bls. wood pulp boards, 10 tons.
Lagerloef Trading Co., *Cliffwood,* Helsingfors, 130 bls. mechanical pulp, 26 tons.
Lagerloef Trading Co., *Cliffwood,* Helsingfors, 3810 bls. sulphite, 737 tons.
Lagerloef Trading Co., *Cliffwood,* Helsingfors, 1258 bls. sulphate, 209 tons.
Gottesman & Co., Inc., *Cliffwood,* Helsingfors, 508 bls. mechanical pulp, 101 tons.
Castle & Overton, Inc., *Cliffwood,* Helsingfors, 1392 bls. sulphite, 276 tons.
Neidich Process Co., *Cliffwood,* Helsingfors, 82 bbls., 1 cs. paper.
Jay Madden Corp., *Cliffwood,* Helsingfors, 80 bls. newsprint.
Price & Pierce, Ltd., *Cliffwood,* Wallvik, 8168 bls. unbleached sulphite.
R. Blank, *Collamer,* Havre, 191 bls. rags.
Castle & Overton, Inc., *Collamer,* Havre, 34 bls. bagging, 449 bls. rags.
J. M. Maris Co., *Collamer,* Havre, 8 cs. filter paper.
———, *Collamer,* Havre, 200 bags casein.
F. Weber Co., *Collamer,* Havre, 1 cs. writing paper.
E. J. Keller Co., Inc., *Alberta,* ———, 85 bls paper stock.
E. J. Keller Co., Inc, *Black Hawk,* ——— 262 bls. paper stock.

BALTIMORE IMPORTS

WEEK ENDING MAY 8, 1937

Washington Post, *Markland,* Liverpool, N. S., 2293 rolls newsprint.
Congoleum Nairn Co., *Collamer,* Havre, 239 bls. rags.
Castle & Overton, Inc., *Beemsterdyk,* Rotterdam, 610 bls. wood pulp.
Congoleum Nairn Co., *Beemsterdyk,* Rottendam, 152 bls. rags.
———, *Beemsterdyk,* Rotterdam, 520 bls. wood pulp.
M. Sone, *Consul Olsson,* Gothenburg, 284 bls. wood pulp.
M. Sone, *City of Hamburg,* Hamburg, 497 bls. wood pulp.
M. Sone, *Alberta,* Trieste, 1020 bls. wood pulp.

NEW ORLEANS IMPORTS

WEEK ENDING MAY 8, 1937

Mente Co., *Venice Maru,* Kobe, 118 bls. bagging.
N. Y. Trust Co., *Collamer,* Havre, 115 bls. bagging.

General Refractories Elects

At a meeting of the board of directors of General Refractories Company, held on April 16, 1937, S. M. D. Clapper, formerly president, was elected chairman of the board, and Floyd L. Greene, formerly executive vice-president, was elected president.

J. Andersen & Co.
Selling Agents
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CHEMICAL & MECHANICAL PULP

Kraft Pulp
BERGVIK OCH ALA NYA AKTIEBOLAG
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KALIX TRÄINDUSTRI AKTIEBOLAG
Vanoffärden, Sweden
MUNKSUNDS AKTIEBOLAG
Munksund, Sweden
NENSJÖ CELLULOSA A.-B.
Sprängsviken, Sweden

Unbleached Sulphite
AKTIESELSKABET GREAKER CELLULOSEFABRIK
Greaker, Norway
BERGVIK OCH ALA NYA AKTIEBOLAG
Söderhamn, Sweden
CELLULOSEFABRIKS A.-G.
Bratislava, Czecho-Slovakei
SVANÖ AKTIEBOLAG
Svanö, Sweden

Bleached Sulphite
KELLNER-PARTINGTON PAPER PULP CO., LTD.
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NASH ENGINEERING CO., SO. NORWALK, CONN.

Miscellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, May 12, 1937.

BLANC FIXE—The position of the blanc fixe market is practically unchanged. Prices are holding to schedule. The pulp is quoted at from $42.50 to $45 per ton, in bulk; while the powder is selling at from 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER—Conditions in the bleaching powder market are satisfactory. The contract movement is well up to average. Prices are maintained at formerly quoted levels. Bleaching powder is offered at from $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN—The casein market is somewhat easier. Domestic standard ground casein is quoted at from 13¾ to 14¼ cents per pound; while domestic finely ground casein is selling at from 14¼ to 14¾ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA—Steadiness prevails in the caustic soda market. The contract movement is normal. Prices are steady. Solid caustic soda is quoted at from $2.55 to $2.60; while the flake and ground are selling at from $2.85 to $3 per 100 pounds, in drums, at works.

CHINA CLAY—The china clay market is displaying strength. Shipments against contract are moving freely. Imported china clay is quoted at from $15 to $21 per ton, ship side; while domestic paper making clay is selling at from $6.50 to $12 per ton, at works.

CHLORINE—Business in the chlorine market is holding up well. The contract movement is normal for the season. Prices are maintained at formerly quoted levels. Chlorine is selling at from $2.15 to $2.25 per 100 pounds, in tank cars, at works.

ROSIN—The rosin market is little changed. Paper making gum rosin is now quoted at $8.30 and wood rosin at $8.50 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $3.70 per 100 pounds, in tank cars, at works.

SALT CAKE—Demand for salt cake is persistent. Prices are steady and unchanged. Salt cake is quoted at from $12 to $13; chrome salt cake at from $11 to $12 per ton, at works; while imported salt cake is selling at from $12 to $13 per ton, ship side.

SODA ASH—The soda ash market is fairly buoyant. Demand from the paper mills is insistent. Prices are holding to schedule. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH—Offerings of starch are moving into consumption in good volume. The contract movement is normal. Prices are steady. Special paper making starch is quoted at $4 per 100 pounds, in bags; and at $4.27 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA—The sulphate of alumina market is stronger. Contract shipments are moving freely. Commercial grades are quoted at from $1.35 to $1.60; while iron free is selling at from $2 to $2.25 per 100 pounds, in barrels, at works.

SULPHUR—The sulphur market is steady. Yearly contracts are quoted at $18 per long ton on orders of 1,000 tons, or over and $20 on smaller quantities. On spot and nearby car loads the quotation is $21 per ton. All quotations are in car lots, at works.

TALC—Paper mill demand for talc is moderately active. In most instances prices are holding to schedule. Domestic talc is quoted at from $15 to $18 per ton, at eastern mines; while imported talc is selling at from $23 to $30 per ton, on dock.

Market Quotations

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds		Ledgers
100% Rag Ext. No. 1	.36	@	.37
100% Rag	.29	@	.30
75% Rag	.22	@	.23
65% Rag	.19	@	.20
50% Rag	.15½	@	.16½
25% Rag	.13	@	.14

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds		Ledgers
No. 1 Sulphite	8.00	@	9.00
No. 2 Sulphite	7.00	@	8.00
No. 3 Sulphite	6.75	@	7.75
No. 4 Sulphite	6.50	@	7.50

Book, B Grade, Cased (f.o.b. mill less carload freight allowed)

S. & S. C.	6.00	@	—
S. & S. C. Litho.	6.25	@	—
M. F.	5.75	@	—
No. 4 Coated and Enamel	7.00	@	—
No. 4 Coated Litho	7.00	@	—

Tissues—Per Ream—

White No. 1	.95	@	—
White No. 1 M. G.	.92½	@	—
White No. 1½	.67½	@	—
White No. 2	.62½	@	—
Anti-Tarnish M. G.	.75	@	—
Colored	.87½	@	—
Kraft	.75	@	—
Manila	.62½	@	—
Unbleached Toilet	2.60	@	3.30
Bleached Toilet	3.94	@	5.26

Paper Towels—

Unbleached	2.10	@	3.35
Bleached	3.30	@	3.70

Manila—

No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00

Fibre Papers—

No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75

(Delivered New York)

News, per ton—

Roll, contract	42.50	@	—
Sheets	47.50	@	—

Kraft—

No. 1 Northern	5.25	@	5.75
Standard	5.00	@	—
Southern	5.00	@	—
Glazed	4.50	@	—
Striped	4.75	@	—

Boards, per ton—

News	47.50	@50.00
Chip	45.00	@47.50
Sgl. Mla. Ll. Chip	55.00	@60.00
Jute Lined Chip	55.00	@60.00
Kraft Liners	65.00	@67.50
White Pat. Coated	67.50	@70.00
Binders Boards	70.00	@75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—		
Moist	33.00	@36.00
Dry	40.00	@42.00
(Delivered)		
No. 1 Domestic and Canadian	33.00	@36.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	2.90	@	4.50
Prime Qualities—			
Easy-Bleaching Sulphite	3.50	@	3.75
Strong Unbleached Sulphite	3.40	@	3.65

(On Dock, Atlantic Ports)

Kraft Bleached	3.50	@	4.50
Kraft Light & Strong	2.75	@	3.75
Kraft No. 1	2.50	@	3.50
Kraft No. 2	2.50	@	2.75
(F.o.b. Pulp Mill)			
Kraft Domestic	2.50	@	3.25
(Delivered)			
Soda Bleached	2.90	@	—

Add 60 cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	9.00	@	9.25
Silesias, No. 1	6.75	@	7.00
New Unbleached	9.25	@	9.50
Blue Overall	7.50	@	8.00
Fancy	4.00	@	4.50
Washables	3.00	@	3.50
Mixed Khaki Cuttings	4.25	@	4.50
O. D. Khaki Cuttings	4.75	@	5.00

Old Rags

White, No. 1—			
Repacked	3.50	@	3.75
Miscellaneous	3.00	@	3.25
White, No. 2—			
Repacked	2.50	@	2.75
Miscellaneous	2.00	@	2.25
Thirds and Blues—			
Repacked	2.00	@	2.25
Miscellaneous	1.90	@	2.00
Roofing Rags—			
No. 1	Nominal		
No. 2	1.55	@	1.60
No. 3 (bagging)	1.20	@	1.30
No. 4	1.20	@	1.30
No. 5A	1.05	@	1.10

Foreign Rags

New Rags

New Dark Cuttings	2.25	@	2.50
New Mixed Cuttings	2.00	@	2.25
New Light Silesias	5.50	@	5.75
Light Flannelettes	5.50	@	5.75
New White Cuttings	7.00	@	7.50
New Light Oxfords	4.00	@	4.50
New Light Prints	3.00	@	3.25

Old Rags

No. 1 White Linens	7.50	@	8.00
No. 2 White Linens	6.50	@	7.00
No. 3 White Linens	4.50	@	5.00
No. 4 White Linens	2.25	@	2.50
No. 1 White Cotton	4.25	@	4.75
No. 2 White Cotton	3.25	@	3.75
No. 3 White Cotton	2.50	@	2.75
No. 4 White Cotton	1.90	@	2.15
Extra Light Prints	2.00	@	2.25
Ord. Light Prints	1.75	@	1.85
Med. Light Prints	1.55	@	1.65
Dutch Blue Cottons	2.25	@	2.50
French Blue Linens	3.50	@	4.00
German Blue Linens	2.50	@	2.75
German Blue Cottons	2.00	@	2.25
Checks and Blues	2.00	@	2.25
Linsey Garments	2.25	@	2.35
Dark Cottons	2.15	@	2.25
Old Shopperies	1.75	@	2.00
New Shopperies	1.75	@	2.00
French Blues	2.25	@	2.50

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—			
Foreign	2.25	@	2.35
Domestic	2.15	@	2.25
Wool Tares, light	1.75	@	1.85
Wool Tares, heavy	2.20	@	2.35
Bright Bagging	1.70	@	1.75
Manila Rope—			
Foreign	5.00	@	5.25
Domestic	5.25	@	5.50
Jute Strings	2.75	@	3.00
Sisal Strings	2.60	@	2.75
Mixed Strings	Nominal		

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.25	@	3.50
Ordinary Hard White No. 1	2.60	@	2.70
Hard White No. 2	2.50	@	2.60
Soft White No. 1	2.40	@	2.50
Flat Stock—			
Stitchless	1.45	@	1.55
Overissue Mag.	1.45	@	1.55
Solid Flat Book	1.40	@	1.45
Crumbled No. 1	1.20	@	1.25
Ledger Stock	1.30	@	1.35
New B. B. Chips	.65	@	.70
Manila—			
New Env. Cut	2.25	@	2.35
New Cuttings	1.90	@	2.10
Old Kraft Machine—			
Compressed bales	1.80	@	1.90
News—			
No. 1 White News	1.50	@	1.60
Strictly Overissue	.90	@	1.00
Strictly Folded	.70	@	.75
No. 1 Mixed Paper	.65	@	.70

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Twines

(F. o. b. Mill)

(Soft Fibre)

Coarse Polished—			
India	.16	@	.18½
Belg. White Hemp	.17	@	.20½
India Compress	.16½	@	.17
Fine Polished—			
Fine India	.22	@	.24
Unpolished—			
Box	.11¾	@	.12¼
Paper Makers	.11½	@	.13¾
Tube Rope	.12½	@	.15¼
Wall Paper	.13½	@	.14¼
Wrapping	.17	@	.21
Soft Fiber Rope	.14¾	@	.15¼

(Hard Fibre)

Bond	.13½	@	.22
Anchor	.13	@	.14½
Manila	.21	@	.28

PHILADELPHIA

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28½	.29
75% Rag	.21½	.22
65% Rag	.18½	.19
50% Rag	.16	.16
25% Rag	.13½	.13½

Sulphite Bond & Ledgers—

	Bonds	Ledgers
No. 1 Sulphite	8.00	8.75
No. 2 Sulphite	7.25	8.25
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	6.50	7.50

(F. o. b. Mill)

Book, M. F.	5.00	@	—
Book, S. S. & C.	5.25	@	—
Book, Coated	6.75	@	—
Coated Lithograph	6.75	@	—
No. 1 Jute Manila	10.50	@	—
Manila Sul., No. 1	6.75	@	—
Manila No. 2	4.25	@	—
No. 1 Kraft	6.00	@	—
Southern Kraft	5.00	@	—
News Print Rolls	42.50	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Corload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.08	@	.08½
New White, No. 2.	.04½	@	.05
Light Silesias	.05½	@	—
Silesias, No. 1	.04½	@	.05
Black Silesias, soft.	.03½	@	.04
New Unbleached	.06	@	—
Washable, No. 1	.02	@	.02½
Blue Overall	.07	@	.07½
Cottons—According to grades—			
Washable, No. 2	.02½	@	.04½
New Blue	.02	@	.02½
Fancy	.03	@	—
New Black Soft	.04	@	.04½
New Light Seconds	.03½	@	.04
New Dark Seconds	2.00	@	2.25
Khaki Cuttings—			
No. 1 O. D.	.04	@	.04½
No. 2 Mixed	.03½	@	.04
Corduroy	.02	@	.02¼
New Canvas	.04	@	.04½
New Black Mixed.	.02	@	.02¼

Domestic Rags (Old)

White No. 1—			
Repacked	4.00	@	4.50
Miscellaneous	3.00	@	3.50
Thirds and Blues—			
Miscellaneous	2.00	@	2.25
Repacked	2.50	@	2.75
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1	2.20	@	2.25
Domestic No. 1	2.00	@	2.10
Domestic No. 2	1.90	@	2.00
Roofing Bagging	1.75	@	—

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	2.00	@	—
Domestic	2.25	@	—
Manila Rope	4.50	@	—
Sisal Rope	3.00	@	—
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	2.25	@	2.50
No. 2	1.00	@	1.10
Wool Tares, heavy	3.25	@	3.50
Mixed Strings	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.50	@	2.75

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White.	—	@	2.60
No. 2 Hard White.	2.20	@	2.25
No. 1 Soft White.	2.00	@	2.10
No. 2 Soft White.	1.75	@	—
No. 1 Mixed	—	@	.85
Solid Ledger Stock	—	@	1.75
Ledger Stock, white.	1.75	@	—
Ledger Stock, colored	1.50	@	—
No. 1 Books, heavy	1.20	@	1.25
Manila Cuttings	1.80	@	1.90
Print Manila	.75	@	.85
Container Manila	.80	@	—
Kraft Paper	1.75	@	—
No. 1 Mixed Paper	.65	@	—
Straw Board Chip	.50	@	—
Binders Board Chip.	.50	@	—
Corrugated Board	.70	@	.80
Overissue News	.75	@	.80
Old Newspapers	.65	@	.70

BOSTON

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.65	8.65
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.25	7.25
No. 4 Sulphite	6.50	7.50

F.o.b. Mill

Book, Super	.06½	@	.09½
Book, M. F.	.06	@	.09
Book, Coated	.09	@	.18½
Coated Litho	.09	@	.12
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¾	@	.06½
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.05¼	@	—
No. 2 Kraft	.05	@	—

(Delivered New England points)

Southern Kraft	.05	@	—
News Print Rolls	42.00	@	—
Straw Board, rolls.009	42.50	@	45.00
Filled News Board	50.00	@	52.50
Chip Board	47.50	@	50.00
Single Manila Lined Chip	57.50	@	62.50
Single White, Patent Coated News Board (Bender)	70.00	@	77.50
Wood Pulp Board	70.00	@	75.00
Binder Boards (Standard Grade)	75.00	@	80.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	2.20	@	2.35
No. 1 Soft White.	1.85	@	2.15
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.50	@	1.75
Overissue Ledger Stock	1.30	@	1.50
Mixed Ldgers	.85	@	.90
No. 1 Books, heavy	1.40	@	—
No. 1 Books, light	.65	@	.75
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.60	@	1.70
Manila Env. Cuttings, extra quality	2.20	@	2.30
No. 1 Old Manila	.95	@	1.00
White Blank News	1.30	@	1.40
No. 1 Kraft	1.90	@	2.00
Mixed Papers	.60	@	.65
Print Manila	.75	@	.85
Container Manilas	.27½	@	—
Old Newspapers	.60	@	.65
Overissue News	.50	@	.65
Box Board Chips	.55	@	.60
Corrugated Boxes	.80	@	.85
Kraft corrugated boxes	1.60	@	1.65
Screening Wrappers	.60	@	.65

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	4.75	@	5.00
Domestic	5.00	@	5.30
Transmission Rope	2.00	@	2.25
Jute Rope	2.50	@	2.75
Soft Jute Strings	2.75	@	3.00
Jute Carpet Threads	1.75	@	2.00
Gunny No. 1—			
Foreign	2.50	@	2.60
Domestic	2.10	@	2.15
Bleachery Burlap	4.25	@	4.50
Scrap Burlap—			
Foreign	2.15	@	2.25
Domestic	1.85	@	2.10
Scrap Sisal	2.60	@	2.75
Scrap Sisal for Shredding	2.75	@	3.00
Wool Tares, heavy	2.40	@	2.60
New Burlap Cuttings	2.85	@	3.00
Aust. Wool Pouches	3.25	@	3.30
Heavy Baling Bagging	2.40	@	2.60
Paper Mill Bagging	1.75	@	1.80
Bagging No. 2	1.70	@	—

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	.04	@	.04¼
New White No. 1.	.09	@	.09¼
New White No. 2.	.06¼	@	.07
New Light Flannelettes	.07½	@	—
Silesias No. 1	.07¾	@	.08
New Black Silesias	.04¼	@	.04½
Soft Unbleached	.09½	@	.09¾
Blue Cheviot	.07½	@	.07¾
Fancy	.03¾	@	.04
Washable	.03	@	.03¼
Kraft, M. F.	6.00	@	—
Cottons—According to grades—			
Blue Overalls	.07½	@	.07¼
New Black, soft	.04¼	@	.04½
Khaki Cuttings	.04¾	@	.05
O. D. Khaki	.05	@	.05¼
Corduroy	.03¼	@	.03½
New Canvas	.07¾	@	.08¼
B.V.D. Cuttings	.08¾	@	.09

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.75	@	2.00
Third and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	3.90	@	4.00
Roofing Stock—			
No. 1	1.55	@	1.65
No. 2	1.45	@	1.50
No. 3	1.25	@	1.30

Foreign Rags

(F. o. b. Boston)

Dark Cottons	1.90	@	2.00
Dutch Blues	3.00	@	3.15
New Checks and Blues	2.85	@	3.00
Old Fustians	2.85	@	3.00
Old Linsey Garments	2.50	@	2.65
New Silesias	6.50	@	7.00

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.12	@	.40
Water Marked Sulphite Bond	.06¾	@	.11
Sulphite Bond	.05½	@	.07¼
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¼
No. 2 M. F. Book	.05¼	@	.06¼
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¼	@	.05¾
No. 1 Fibre	.04¾	@	.05½
No. 2 Manila	.04¼	@	.04¾
Butcher's Manila	.03¼	@	.03¾
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06½
Sulphite Screenings	.03	@	.03¼
Manila Tissue	.05¾	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News, per ton—			
Rolls, contract	42.00	@	—
Sheets, open	47.00	@	—
Boards, per ton—			
Plain Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent Coated	65.00	@	—
Container Lined—			
85 Test, per 1000 sq. ft.			1.70
100 Test, per 1000 sq. ft.			1.85

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings	3.30	@	3.40
No. 1 Hard White.	2.60	@	2.70
No. 1 Soft White.	2.10	@	2.25
Ledger & Writings	1.40	@	1.50
Solid Books	1.25	@	1.30
Blanks	1.50	@	1.65
Krafts	1.00	@	1.25
New Kraft Cuts	1.80	@	2.00
Manila Env. Cuts	2.20	@	2.35
Ex. No. 1 Manila	2.20	@	2.35
Print Manila	1.70	@	1.80
Overissue News	.80	@	.90
Old Newspapers—			
No. 1 Folded News	.80	@	.90
No. 1 Mixed Paper	.80	@	.90
Roofing Stocks—			
No. 1	2.00	@	2.25
No. 2	1.85	@	2.00

TORONTO

Paper

Bonds and Ledgers

Delivered

No. 1 White	.35½	@	—
No. 1 Tints	.36½	@	—
No. 2 White	.26½	@	—
No. 2 Tints	.27½	@	—
No. 4 White	.15	@	—
No. 4 Tints	.16	@	—
No. 5 Bond—White	.11	@	—
No. 5 Bond—Tints	.12	@	—
No. 5 Bond—Golden Rod	.13	@	—
No. 5 Ledger—White	.11½	@	—
No. 5 Ledger—Tints.	.12	@	—
No. 6 Bond—White	.10½	@	—
No. 6 Bond—Tints	.11	@	—
No. 6 Bond—Golden Rod	.12½	@	—
No. 7 Bond—White	.08¾	@	—
No. 7 Bond—Tints	.09¼	@	—
No. 7 Bond—Golden Rod	.10¾	@	—
Book—			
No. 1 M. F.	6.75	@	7.00
No. 2 M. F.	6.50	@	6.75
No. 3 M. F.	5.25	@	5.75
No. 1 S. C.	7.25	@	7.50
No. 2 S. C.	6.75	@	7.00
No. 3 S. C.	5.75	@	6.00
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.85	@	—
White Wrap	4.00	@	—
"B" Manila	4.90	@	—
No. 1 Manila	5.50	@	—
Fiber	5.50	@	—
Kraft, No. 2	5.50	@	—

F. o. b. Cars, Toronto)

News, per ton—			
Rolls (contract)	38.50	@	—
Sheets	45.50	@	—

Pulp

Ground wood	30.00	@	31.00
Unbleached Sulphite	52.00	@	53.00
Book (Class 1)	65.00	@	66.00
Writing (Class 2)	66.00	@	67.00
Select (Class 3)	67.00	@	68.00

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut.	2.50	@	—
Soft White	2.15	@	—
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	1.00	@	—
Light and Crumpled Book Stock.	1.15	@	—
Ledgers and Writings	1.20	@	—
Manilas—			
New Manila Cut	1.50	@	—
Printed Manilas	.55	@	—
Kraft	1.00	@	1.60
News and Scrap—			
Strictly Overissue	.75	@	—
Strictly Folded	.80	@	—
No. 1 Mixed Paper	.65	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.09	@	.09¼
Fancy Shirt Cuttings	.03¾	@	.04